This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

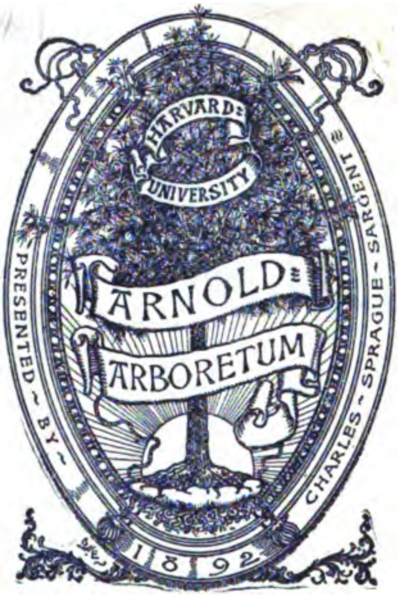
+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at http://books.google.com/

P

7527
R8-1


HARVARD
UNIVERSITY
ARNOLD
ARBORETUM
PRESENTED ~ BY ~ CHARLES ~ SPRAGUE ~ SARGENT
1892

H. Alleyne Nicholson
1862

MAGAZINE

OF

ZOOLOGY AND BOTANY.

CONDUCTED BY

SIR W. JARDINE, BART.—P. J. SELBY, ESQ.

AND

DR JOHNSTON.

" *Rerum naturalium sagax Indagator.*"

VOLUME FIRST.

W. H. LIZARS, EDINBURGH;
S. HIGHLEY, 32, FLEET STREET, LONDON; AND
W. CURRY, JUN. & CO., DUBLIN.

MDCCCXXXVII.

BI
9

"Omnes res creatæ sunt divinæ sapientiæ et potentiæ testes, divitiæ felicitatis humanæ; ex harum usu *bonitas* Creatoris; ex pulchritudine *sapientia* Domini; ex œconomia in *conservatione, proportione, renovatione,* potentia majestatis elucet. Earum itaque indagatio ab hominibus sibi relictis semper æstimata; a verè eruditis et sapientibus semper exculta; male doctis et barbaris semper inimica fuit."—LINN.

PRINTED BY JOHN STARK, EDINBURGH.

CONTENTS.

ORIGINAL COMMUNICATIONS.

No. I.

I. Some Remarks on the Study of Zoology, and on the present state of the Science. By the Rev. LEONARD JENYNS, M. A.; F. L. S.; F. Z. S.; &c. . . . . . Page 1

II. On the Disunion of contiguous Layers in the Wood of Exogenous Trees. By Rev. J. S. HENSLOW, M. A. Professor of Botany in the University of Cambridge, ... 32

III. The Natural History of the British Entomostraca. By WILLIAM BAIRD, Surgeon, ... 35

IV. Notices of British Fungi. By Rev. M. J. BERKELEY, M. A. No. 1. 42

V. Contributions to the Ichthyology of the Firth of Forth. By R. PARNELL, M. D. No. 1. 50

VI. The Honey-bee community. Length of life allotted to its different members. By EDWARD BEVAN, M. D. 57

VII. On the Genus Paradoxornis. By J. GOULD, F. L. S., &c. . 62

VIII. The Natural History of British Zoophytes. By GEORGE JOHNSTON, M. D., Fellow of the Royal College of Surgeons of Edinburgh, 64

No. II.

I. On the requisites necessary for the advance of Botany. By the Rev. J. S. HENSLOW, M. A., Professor of Botany in the University of Cambridge, ... 113

II. Observations on the Digestive Organs of Birds. By WILLIAM MACGILLIVRAY, A. M., F. R. S. E., M. W. S. Conservator of the Museum of the Royal College of Surgeons of Edinburgh, . 125

III. Botanical Notes. By CHARLES C. BABINGTON, M. A. F. L. S. &c. 136

IV. The Characters of two new Genera of South African Reptiles, with descriptions of species belonging to each. By ANDREW SMITH, M. D., M. W. S., &c. 141

V. Characters and Descriptions of the Dipterous Insects indigenous to Britain. By JAMES DUNCAN, M. W. S., &c. &c. . 145

VI. Notice of the Lutjanus rupestris of Bloch. By P. J. SELBY, Esq. F. R. S. E., &c. 167

VII. Observations on some circumstances attending the process of Exuviation in Shrimps and Lobsters. By JONATHAN COUCH, F. L. S. 170

No. III.

I. On the Natural History and Relations of the Family of Cuculidæ or Cuckoos, with a view to determine the series of their variation. By WILLIAM SWAINSON, F. R. & L. S. &c. . . 213

II. The Natural History of British Zoophytes. By **GEORGE JOHNSTON**, M. D. Fellow of the Royal College of Surgeons of Edinburgh, Page 225

III. On the Pollan (Coregonus pollan, Thompson,) of Lough Neagh. By **WILLIAM THOMPSON**, Esq., Vice-President of the Natural History Society of Belfast, . . , . 247

IV. Descriptions of some new species of Exotic Coleopterous Insects from the collection of Sir Patrick Walker. By **J. O. WESTWOOD**, F. L. S., &c. 251

V. On the Comparative Elevation of Testacea in the Alps. By **EDWARD FORBES**, ... 257

VI. On the Structure of the Flowers of Adoxa Moschatellina. By the Rev. **J. S. HENSLOW**, M. A. Professor of Botany in the University of Cambridge, ... 259

No. IV.

I. The Natural History of the British Entomostraca. By **WILLIAM BAIRD**, Surgeon, ... 309

II. Observations on the Germination of Ferns. By Mr **J HENDERSON**, 333

III. Observations on the process of Exuviation in the Common Crab (Cancer pagurus, Linn.) By **JONATHAN COUCH**, F. L. S. . 341

IV. Contributions to the Ichthyology of the Firth of Forth. No. II. By **RICHARD PARNELL**, M. D. . . . 344

V. Observations on the Raptores of South America. Translated from " Voyages dans l'Amerique Meridionale, par M. **ALCIDE D. D'ORBIGNY**," 347

VI. Characters and Descriptions of the Dipterous Insects indigenous to Britain. By **JAMES DUNCAN**, M. W. S., &c. &c. . 359

VII. Miscellanea Zoologica. By **GEORGE JOHNSTON**, M. D. Fellow of the Royal College of Surgeons of Edinburgh, . , 368

VIII. Remarks on the Reproductive Organs of Pilularia globulifera, and the Globules of Chara Vulgaris. By Mr **GEORGE DICKIE**, . 382

No. V.

I. Observations on the importance of a Local Fauna ;—exemplified in the Fauna of Twizel. By **P. J. SELBY**, F. R. S. E., . 421

II. Observations on the construction of a Local Flora. By **H. COTTEREL WATSON**, Esq. 424

III. On the Natural History and Relations of the family of Cuculidæ or Cuckoos, with a view to determine the series of their variation. By **WILLIAM SWAINSON**, F. R. & L. S., &c. . . 430

IV. Some account of the Comparative Anatomy of two species of the genus Cercocebus, Geoffroy. By **P. C. EYTON**, Esq. . , 437

V. The Natural History of British Zoophytes. By **GEORGE JOHNSTON**, M. D. Fellow of the Royal College of Surgeons of Edinburgh, 440

VI. Notes on the Hawfinch (Coccothraustes vulgaris, Cuv.) as observed in the vicinity of Epping Forest. By **HENRY DOUBLEDAY**, Esq. 448

VII. On Hybrids produced in a Wild State between the Black-Grouse (Tetrao tetrix,) and Common Pheasant (Phasianus Colchicus.) By **WILLIAM THOMPSON**, Esq. Vice-President of the Belfast Natural History Society, ... 450

VIII. Characters and Descriptions of the Dipterous Insects indigenous to Britain. By JAMES DUNCAN, M. W. S., &c. &c. . Page 453
IX. Contributions to the Natural History of Ireland. By WILLIAM THOMPSON, Esq. Vice-President of the Natural History Society of Belfast, ... 459
X. Descriptions of two new species of Opuntia; with remarks on the Structure of the Fruit of Rhipsalis. By Rev. J. S. HENSLOW, M. A. Professor of Botany in the University of Cambridge, . 466

VI.

I. Notices of British Fungi. By Rev. M. J. BERKELEY, M. A., F. L. S. 507
II. The Natural History of the British Entomostraca. By WILLIAM BAIRD, Surgeon, H. C. S. . . . 514
III. Contributions to British Ichthyology. By R. PARNELL, M. D. 526
IV. Miscellanea Zoologica. By GEORGE JOHNSTON, M. D. Fellow of the Royal College of Surgeons of Edinburgh, . . 529
V. Notes regarding the distinctive habits of the Scotch Phocæ or Seals. By JAMES WILSON, F. R. S. E., &c. . . . 539

REVIEWS AND CRITICAL ANALYSIS.

No. I.

I. Iconographia della Fauna Italica. Di CARLO LUCIANO BONAPARTE, Principe de Musignano. Folio, . . . 82
II. The English Flora. By Sir J. E. SMITH, M. D., F. R. S., &c. The British Flora. By W. J. HOOKER, LL. D., F. R. S., &c. The English Flora, Vol. v. part i. (Or the British Flora, Vol. ii. Part i.) By W. J. HOOKER, LL.D, F. R. S., &c. . . 93

PERIODICALS.

The Edinburgh New Philosophical Journal, . . . 99
The Magazine of Natural History, and Journal of Zoology, Botany, Mineralogy, Geology, and Meteorology, . . . 100
Annales des Sciences Naturelles, ... 101
American Journal of Sciences and Arts, . . . 102

No. II.

I. De l'Histoire Naturelle des Cétacés, ou Recueil et Examen des faits dont se compose l'Histoire Naturelle des ces Animaux. Par M. F. CUVIER, ... 174
II. A Monograph of the Family Ramphastidæ. By J. GOULD, F. L. S. Three Parts, folio, ... 187

PERIODICALS.

The Entomological Magazine, ... 192
Annales des Sciences Naturelles. Zoologie, MM. AUDOUIN et MILNE-EDWARDS. Botanique. MM. AD. BRONGNIART et GUILLEMIN, 193
Archiv für Anatomie physiologie und Wissenschaftliche Medicin, &c. Von JOANNES MULLER, ... 196

No. III.

I. Flora Hibernica, comprising the Flowering Plants, Ferns, Characeæ, Musci, Hepaticæ, Lichenes, and Algæ of Ireland, arranged according to the Natural System, with a Synopsis of the Genera according to the Linnæan System. By JAMES TOWNSEND MACKAY, M. R. I. A. &c. . . . . . . Page 262
II. Voyage aux Indes Orientales, par le nord de l'Europe, pendant les années 1825-26-27-28 and 29. ZOOLOGIE, par MM. C. BELANGER, ISIDORE GEOFFROY SAINT HILAIRE, LESSON, VALENCIENNES, DESHAYES, et GUERIN, . . 269
III. Neue Wirbelthiere zu der Fauna von Abyssinien gehörig, entdeckt und beschrieben, von Dr EDWARD RÜPPELL, . . 275

BIBLIOGRAPHICAL NOTICES.

A History of British Quadrupeds. By THOMAS BELL, F. R. S., &c. . 280
Flora Metropolitana, or Botanical Rambles within thirty miles of London, intended for the Student in Practical Botany. By DANIEL COOPER, 281
The Ornithologist's Text-Book. By NEVILLE WOOD, Esq. . 281
British Song Birds, being popular Descriptions and Anecdotes of the Choristers of the groves. By NEVILLE WOOD, Esq. . . 282
Collection de Perroquets, pour faire suite a la publication de Levaillant. Par le Dr A. BOURJAT SAINT HILARE, . . . 282
Histoire Naturelle des Poissons. Par M. le BARON CUVIER, et M. A. VALENCIENNES, ... 283
Histoire Naturelle Generale et Particuliere de tous les Genres de Coquilles Univalves marines à l'etat vivant et fossiles. Par P. L. DUCLOS, 284
Observations on the Genus Unio, together with descriptions of New Genera and Species in the Families Naïades, Conchæ, Columacea, Lymnæana, Melaniana and Peristomiana. By ISAAC LEA, . . 284
Erpetologie Generale ou Histoire Naturelle complete des Reptiles. Par M. C. DUMERIL and G BIBRON, ... 285

PERIODICALS.

The Edinburgh New Philosophical Journal. Conducted by Prof. JAMESON, 286
The Magazine of Natural History. Conducted by J. C. LOUDON, . 287
Entomological Magazine, ... 288
Companion to the Botanical Magazine. By SIR W. J. HOOKER, . 289
Annales des Sciences Naturelles, ... 290
Archiv für Anatomie, Physiologie, und Wissenschaftliche Medicin, &c. Von Dr JOANNES MÜLLER, ... 292

No. IV.

I. A History of British Fishes. By WILLIAM YARRELL, F. L. S. 384
II. A Catalogue of British Plants, arranged according to the Natural System. By the Rev. J. S. HENSLOW, M. A. 393
III. The Northern Flora; or a description of the Wild Plants belonging to the north and east of Scotland, with an account of their places of growth and properties. By ALEXANDER MURRAY, M. D. 396

BIBLIOGRAGHICAL NOTICES.

Catalogue of British Plants, printed for the Botanical Society of Edinburgh, 398

A History of the rare Species of British Birds; intended as a supplement to the History of British Birds by the late Thomas Bewick. By T. C. Eyton, Esq. . . . . Page 400
Herpetologia Mexicana. Edidit Dr Arend. Friedericus Augustus Weigman, ... 401
British Fungi, consisting of dried Specimens of the Species described in Vol. v. Part ii. of the English Flora. By the Rev. M. J. Berkeley, M. A. 401

PERIODICALS.

The Edinburgh New Philosophical Journal. Conducted by Prof. Jameson, 402
The Magazine of Natural History. Conducted by J. C. Loudon, . 402
Companion to the Botanical Magazine, ... 403
Abhandlungen der Koniglichen Akademie der Wissenchaften zu Berlin, . 404
Annales des Sciences Naturelles, ... 412

No. V.

Histoire Naturelle des Iles Canaries. Par MM. P. Barker-Webb et Sabin Berthelot, ... 470

BIBLIOGRAPHICAL NOTICES.

Hymenopterorum Inchneumonibus affinium monographiæ, Genera Europæa et Species illustrantes. Scripsit C. G. Nees ab Esenbeck, . 482
Forstinseckten, &c. Forest Insects. The Natural History of Insects which prove injurious to Woods. By Professor E. A. Rossmæssler, . 483

PERIODICALS.

Transactions of the Zoological Society of London, ... 484
Annales des Sciences Naturelles, ... 584
The Magazine of Natural History, ... 486
Entomological Magazine, ... , 490

No. VI.

I. Dr Lardner's Cabinet Cyclopædia. Natural History. 1. On the Geography and Classification of Animals. By W. Swainson, Esq.—2. Classification of Quadrupeds. By W. Swainson, Esq. 545
II. Suites à Buffon, formant, avec les œuvres de cet auteur, un cours complet d'histoire naturelle. Collection accompagneée de planches. Diptères, par M. Macquart. Tom. i. 1834.—Species Général des Lepidoptères, par le Dr Boisduval. Tom. i. 1836. . 567

BIBLIOGRAPHICAL NOTICES.

A Synopsis of the Birds of Australia and the adjacent Islands. By John Gould, F. L. S., &c. 571
Birds of Europe. By John Gould, F. L. S. . . 572
Illustrations of Ornithology. By Sir W. Jardine, and P. J. Selby, . 573

PERIODICALS.

Transactions of the Linnæan Society of London, . . 573
The Edinburgh New Philosophical Journal. Conducted by Prof. Jameson, 574
Loudon's Magazine of Natural History. 575
Entomological Magazine, ... 577

Companion to the Botanical Magazine, . . . Page 578
Nouveaux Memoires de la Société Imperiale des Naturalistes de Moscow, 583
Bulletin de la Société Imperiale des Naturalistes de Moscow, . 584
Muller's Archiv für Anatomie, Physiologie, &c. . . 586
Linnea—Ein Journal für die Botanik, u. s. w. . . 587
Annales des Sciences Naturelles, ... 588

INTELLIGENCE.

No. I.

Zoological, 103.—Botanical, 106.—Miscellaneous, 107.—Proceedings of Societies, &c. 109.—Obituary, ... 112

No. II.

Zoological, 198.—Botanical, 201.—Miscellaneous, 202.—Proceedings of Societies, 205.—Obituary, ... 210

No. III.

Zoological, 293.—Botanical, 295.—Miscellaneous—Report of the Sixth Meeting of the British Association for advancement of Science, 297.—Proceedings of Societies, 306.—Obituary, ... 308

No. IV.

Zoological, 414.—Botanical, 415.—Proceedings of Societies, 416.—Miscellaneous, 418.—Obituary, ... 419

No. V.

Zoological, 491.—Botanical, 495.—Miscellaneous,—Proceedings of Societies, 500

No. VI.

Botanical, 591.—Proceedings of Societies, 592.—Obituary, . 595

PLATES.

PLATE I. Ichthyology of the Firth of Forth.
II. III. British Fungi.
IV. Digestive Organs of Aquila chrysaëtos.
V. Intestinal Canal of Buteo vulgaris.
VI. Crenilabrus rupestris.
VII. Coleopterous Insects in Collection of Sir Patrick Walker.
VIII. IX. British Entomostraca.
XI. XII. Germination of Ferns.
XIII. Pycnogonidæ.
XIV. Opuntiæ.
I.* Tadpole Fish.
XV. British Fungi.
XVI. Cypris Pubera.
XVII. XVIII. Planarian Worms.

MAGAZINE

OF

ZOOLOGY AND BOTANY.

ORIGINAL COMMUNICATIONS.

I.—*Some Remarks on the Study of Zoology, and on the present state of the Science.* By the Rev. Leonard Jenyns, M. A.; F. L. S.; F. Z.S.; &c.

Natural History has not only, like most other sciences, made great progress of late years, but it has assumed an importance, to which formerly it in vain attempted to lay claim. It is not, indeed, surprising that so long as it was restricted to collecting plants and animals as mere objects of curiosity, or judged to be of no further consequence than as it admitted of application to economic purposes, it should be either held up to contempt by the majority of thinking men, or tolerated only so far as it was studied with immediate reference to the ends just alluded to. But there are other grounds upon which, in these days, it is deemed worthy of our regard. The mere collector, indeed, is held in no higher esteem than formerly. The advantages we derive from an acquaintance with those organized beings which are capable of supplying the wants, or augmenting the conveniences of life, are not overlooked, but are considered rather as indirect benefits resulting from the cultivation of this science, than as the immediate objects to which all our researches incline. Natural History is of importance from the effects which it produces, or which at least it is capable of producing, upon the human mind. As a study, it tends equally with all other studies to strengthen the faculties, to fix the attention, and, to a certain extent, to exercise our powers of correct judgment and reasoning. As the particular study of those innumerable beings which people the earth, it has an especial tenden-

Companion to the Botanical Magazine,
Nouveaux Memoires de la Société Imperiale des
Bulletin de la Société Imperiale des Natural
Muller's Archiv für Anatomie, Physiol
Linnea—Ein Journal für die Botan
Annales des Sciences Naturelles

Zoological, 103.—
cieties, &c. 109

Zoological,
cieties,

Zool

[illegible] one of its objects [illegible] which these beings bear [illegible] to certain first princi- [illegible] being afterwards transferred to [illegible] of more general application.* [illegible] which accrue from the pursuit of [illegible] recommend it, even when followed for its [illegible] all other inducements. The relaxation [illegible] the mind when fatigued with severer studies, or op- [illegible];—the never-failing entertainment which it yields, [illegible] the most retired and solitary spots;—the charms with which [illegible] invest a country life, diffusing happiness over our leisure hours, and converting every walk into an intellectual treat;—these are fruits which will not be esteemed lightly, or considered by a reflecting mind as beneath its notice. Above all, we may allude to those devout meditations which this science is calculated to suggest to all such as are alive to the impressions of religion. It tends to uphold that secret communion with the Creator, which Revelation so much encourages. And if this remark has been often made, it only shows how general has been the feeling to which it relates. Strange, indeed, must be the perversion of that mind, which is made neither wiser nor better, by studying the works of Him, whose own wisdom is infinite, and all whose operations tend to good and happiness. We are not disposed to wonder because we find some to whom the study itself fails in affording the same degree of interest which we ourselves derive from it. But to have the thoughts leaning of their own accord to such pursuits;—to be able to expatiate with delight on that immense field of wonders which Nature opens to us;—to trace the workings of the most consummate skill, power, and benevolence;—and yet in our researches to find no room for moral improvement,—no incitement to remember the Great Author of all;—we fear this indicates a mind estranged from its own best interests, and but ill qualified for the more exalted employments of a future existence.

In what follows, it is proposed to confine our observations to that branch of Natural History termed Zoology. This, in its widest acceptation, may be defined as the science which treats of every thing relating to the structure, functions, history, and classification of animals. Under the head of structure, is included the form and arrangement of the several organs which enter into the composition of the animal body: under that of functions, the phenomena exhibited by organs, when considered in action and in connection with the rinciple. Hence it appears, that Comparative Anatomy and gy are properly subordinate departments of Zoology. Neverom the immensity of the field which is thus let in upon our last may almost be regarded as distinct sciences; and the ust be considered as restricting his enquiries more exclusively the habits and classification of animals, and to those distinguishing characters by which their different relations are pointed out. Yet, since all natural arrangement is based upon a knowledge of the whole structure, he cannot safely advance on this head any further than the point to which that structure has been revealed by the anatomist. He may succeed in finding certain external signs by which it is possible to discriminate a particular group from all others, but these signs, in order to be of any value, must necessarily be co-ordinate with a given arrangement of the internal organs, which internal organs are therefore assumed as known.

---

* See *Cuv. Reg. An.* Preface, p. xix.

It is difficult to form any adequate idea of the large number of facts, which it falls to the province of Zoology, even thus restricted, to record and classify. So various are the forms assumed by different animals;—so diversified their modes of life,—their habits and economy, —their instincts, whether exerted for the preservation of the individual or for the continuance of the species;—so dispersed the localities in which the yare found resident,—the earth,—the air,—the ocean, —all teeming with their respective inhabitants, and giving rise to a countless series of phenomena;—so complex too are the affinities by which they are severally related to one another;—that there seems hardly any limit to the enquiries which it becomes necessary to make in order to get acquainted with the details of their history. But our astonishment is excited most, by considering the immense number of species included in the animal kingdom, a number far exceeding that of plants and minerals put together. In an article in the Edinburgh New Philosophical Journal, published in October 1833,* the total number of known living species of animals, is estimated at 78,849. This, however, is probably far below the truth, since, according to Mr Macleay, upwards of 100,000 species of *Annulosa* alone are already contained in our cabinets.† What may be the entire number of species actually existing, in all the several classes combined, it is impossible to conjecture. Perhaps it may be thought that we are by this time nearly acquainted with the larger animals. But let it be remembered that a somewhat similar opinion was entertained by Ray so long back as in 1690. The number of known and described species of *Beasts*, under which term *Serpents* also were included, was estimated by that naturalist as not above 150; and he added his belief that "not many of any considerable bigness, in the known regions of the world, had escaped the cognizance of the curious." The number of *Birds* known and described he considered as nearly 500; and the number of *Fishes* the same; and he supposed that "the whole sum of beasts and birds might exceed by a third part, and fishes by one-half, those known."* Now what has been the result of discovery since then with respect to these groups only? The number of *Mammalia* has been raised from 150 to 1200,† the number of *Birds* from 500 to 6500‡; the number of *Reptiles*, included by Ray amongst his *Beasts*, has reached to 1500 §; the number of *Fish*, which he considered the same as that of birds, to 8000.|| But, however large may be the proportion of known to unknown species amongst the vertebrate animals, that proportion must be very different, and in all probability quite insignificant, in the case of the invertebrate. After all one thing is certain; that our lists have, from the earliest times, been gradually extending, in proportion to the increased attention which has been paid to the science; and judging from the immense accessions which they have received during the last fifty years, it is clear that if they continue long to augment in the same ratio, we must be yet at a great distance from the knowledge of the entire number. It may be safely asserted that the number of species left recorded by Linnæus in the twelfth edition of the Systema Naturæ, the date of which is yet upwards of seventy years posterior to that of Ray's work on the Creation, is certainly not one-twentieth part of those we are now acquainted with.

---

* Vol. xv. p. 221.

† Hor. Ent. part ii. p. 468.

With this immense assemblage of beings, and with all their several peculiarities of character and economy, the Zoologist has to treat. Every part of their history calls for his investigation. He must search them out in their native haunts and recesses;—follow them through the several stages of their existence;—observe their habits;—trace the different degrees of resemblance between different species;—and, lastly, from the facts thus accumulated, endeavour to ascend to the knowledge of those general laws upon which depend their affinities and natural classification.—Well might Ray exclaim, with reference

---

* Wisdom of God manifested in the Works of the Creation. Sixth Edition, p. 21.

† L'Institut, 1834, p. 138.

‡ Edinb. New Phil. Journ. Vol. xv. p. 223. § Ibid.

|| Agassiz, Rapport sur les Poissons Fossiles, &c. p. 57.

to such pursuits,—"Here is employment enough for the vastest parts, the most indefatigable industries, the happiest opportunities, the most prolix and undisturbed vacancies." And well might he add, in the words of Seneca,—"*Multum adhuc restat operis, multumque restabit, nec ulli nato post mille sæcula præcludetur occasio aliquid adhuc adjiciendi.*"[*]

If we turn from contemplating this extensive field to taking a general view of what has been as yet effected in it, we shall not be surprised at finding the progress of the science to have been very unequal in its different departments. This may be attributed to two causes. One is the natural predilection shown by most observers towards certain branches of Zoology in preference to others; those especially which are calculated to excite notice by reason of the size or beauty of the animals of which they treat. It is this circumstance which has obtained for the Mammalia and Birds so large a share of the attention of naturalists, whilst it has caused the Reptiles and Fish to be comparatively neglected. The same partiality appears in the case of the Invertebrate animals. It is notorious how the departments of Entomology and Conchology have had their respective admirers from the earliest times, and how seldom we have seen, till lately, any desire manifested to investigate the other portions of that immense group. If here and there we find certain individuals who have devoted themselves to the more obscure tribes;—if Ellis and Lamouroux and a few others have acquired celebrity by their researches into the nature of Corallines and other Zoophytes;—if the name of Müller will be for ever associated with the microscopic Infusoria, and that of Rudolphi with a class of animals from which most other observers would shrink with disgust;—these men stand as illustrious exceptions to the general indifference shown towards such departments, and shine the more conspicuous from having so few competitors in the same field. It may, however, be remarked that at the present day this source of unequal progress is much on the decline. Naturalists do not now restrict themselves so much as formerly to certain branches of the science. There appears to be an earnest wish to set them all as much as possible upon the same footing, and to bring up from the rear some which had for a long time been neglected and overlooked. But another cause operates yet more extensivel and more unavoidably to retard our knowledge of certain groups of animals, and that is the difficulty which in many instances attends the study of them. We find some whose ordinary place of residence is confined to stations not easily accessible, and whose habits and economy are in consequence almost entirely concealed from view. We find others possessed of such a delicate and fragile structure, that all attempt to convey them from their native spots, or to preserve them for future examination and comparison, is rendered hopeless. These remarks are especially applicable to the marine *Invertebrata,* with which our acquaintance is as yet comparatively slight. How many multitudes of species must there be immersed in the profound recesses of a deep ocean, where no net or line ever reached. How many more, which, if known, have been seen only at a casual glance, or at one period of their lives, leaving us in utter ignorance of the details of their history, and of the changes through which they pass in their advancement to maturity. How many, like the *Acalepha,* can hardly be removed from their native element, without entailing the entire disorganization of their substance; and if there be others which we succeed in preserving in our cabinets, how impossible it is, in most instances, to effect the preservation of those parts, on which depend perhaps their most important characters, and in ignorance of which we may adopt the most erroneous views respecting their structure and affinities.

---

[*] Wisdom of God in the Creation, &c. p. 173.

We shall be able to appreciate more fully the impediments to the progress of Zoology arising from the sources last mentioned, if we bear in mind two points of great consequence to be remembered. One is the necessity of studying animals throughout their whole existence in order to become possessed of their true history. Not only do all animals differ more or less in their young and their adult states, but many, probably more than we are at present aware of, undergo such great changes of structure, that, unless viewed in their transition forms, it were almost impossible to identify them as the same species. There is no occasion to allude to the Batrachian Reptiles or to the true Insects, in which these changes have been noticed from the earliest times. But we may draw attention to the circumstance that metamorphosis, to a greater or less extent, has been recently detected in several groups in which it was not supposed formerly to exist, and that therefore we stand in need of further observation to say in what others it may not also occur. Without insisting on the universality of this phenomenon in the class *Crustacea,* which cannot be considered as established, and of which we shall have to speak further presently, we may allude to those marked changes of form which have been noticed in certain groups of that class by M. Milne-Edwards,* and which, if not amounting to actual metamorphosis properly so called, are sufficiently great to mislead the inexperienced naturalist. Equally important are those changes which have been traced with so much attention and care by Dugès in the case of the *Acari*,* and which have thus accounted for the apparent anomaly of hexapod and octopod forms coexisting in the same group. But there are other classes in which the metamorphosis is more complete, and attended by such an entire alteration of habits and economy, that by no possible *a priori* reasoning could we have been led to consider the young and adult states of such animals, if seen separately, as pertaining to the same species. Who would have suspected that the sluggish Barnacle, immoveably fixed to some rock or other marine substance, had ever enjoyed a free independent existence, swimming rapidly in the sea under the form of a small bivalve crustacean? Still less who would have anticipated the nature of those changes which attend the early development of the *compound Ascidiæ ?* animals appearing at birth as separate individuals, and endued with the power of locomotion, uniting afterwards to form one common inert mass !—Yet these are the striking discoveries which have been made known of late years by different observers, and the accuracy of which there appears no reasonable ground for doubting. Now it will hardly be questioned whether it be important for the naturalist to be acquainted with these changes occurring in certain animals. It is obvious that, except he be, he will be constantly mistaking the immature states of such animals for distinct species, or perhaps be even referring them to distinct genera. We know that such errors in fact have occurred over and over again. Thus the larvæ of the *Acari* were, until the researches of Dugès, regarded as permanent forms, and made to constitute a peculiar family in that group comprising several genera. The same was the case formerly with some of the *Entomostraca.* It is also probable that many of the minute animals, which now stand in our systems as distinct forms, are only the first states of some of the higher ones, in which the existence of metamorphosis remains to be discovered.† But it is not merely to avoid the overmultiplication of genera and species that this acquaintance with animals at different periods of their growth is wanted. It is necessary in order to obtain correct views respecting their affinities. There was a time when, to attain this object, it was thought sufficient to look only to the perfect state of the species, and scarcely any notice was taken of the previous stages through which it had passed. This idea, however, is in a great measure abandoned. It is now ascertained that the changes of structure experienced by different animals are all the result of certain fixed laws, closely connected with those which regulate their affinities. Genera which are dissimilar in their adult states sometimes resemble one another during the first periods of their development, thus indicating a relationship which would escape our notice except we were made acquainted with their early history.* It was not until their metamorphosis had been detected, that the *Cirripeda* were fully ascertained to be allied to the *Entomostraca*, or the *Lernææ* to the *siphonostomous Crustacea*.

---

* Ann. des Sci. Nat. 1835, tom. iii. p. 321.

---

* Ann. des Sci. Nat. 1834, tom. i. pp. 5 and 144; and tom. ii. p. 18.

† Milne-Edwards thinks it probable that some of the *Cercariæ* are only the young of the *compound Ascidiæ* during the first stage of their existence.—See Lamarck's Hist. Nat. des An. sans Vert. (2d edit.) tom. i. p 428.

Another point of no less importance to be attended to than the study of animals at different periods of their existence, is the study of their whole structure. We need only observe how imperfect our arrangement of the *Mollusca* was, so long as conchologists contented themselves with the knowledge of shells, apart from all regard to the nature of their animal inhabitants; or how far we are still removed from understanding the affinities of several other groups, of whose structure we know little beyond the external form.—In all such cases we are carried away by partial resemblances, and led to attach an undue value to organs exercising only a subordinate function in the economy. Thus the characters afforded by shells are not necessarily in direct connection with those derived from the internal organization. Several instances to the contrary have been adduced by Mr Gray in a paper lately published in the Philosophical Transactions.† The most remarkable are those of the genera *Patella* and *Lottia*. It is observed that in these genera the shells are so perfectly alike, that after a long-continued study of numerous species of each genus, Mr Gray cannot find any character by which they can be distinguished with certainty, yet their animals are so extremely dissimilar, as to be referable to two very different orders of *Mollusca*. The Zoophytes or *Polypi* have been subjected to the same misarrangement as the *Mollusca*, owing to attention having been given almost exclusively to the nature of the calcareous covering. It was thought by Lamouroux, that this alone was sufficient to serve as the basis of their classification. It is now found that the included animals exhibit very different degrees of complexity of structure; and that while some are true *Polypi*, others are more nearly allied to the *compound Ascidiæ*.* Indeed it may be observed generally, that the lower we descend the scale of organization, the less reliance are we able to place upon mere external characters, and the more it becomes necessary to investigate those derived from anatomical researches.

---

* It would lead us too much into detail, or we might here allude to those beautiful generalizations lately established by Milne-Edwards with regard to the changes of form which occur before and after birth in the *Crustacea*.—See his memoir in the Ann. des Sci. Nat. already alluded to; also a Report on that memoir by M. Isidore Geoffroy St Hilaire. Id. 1833, tom. xxx. p. 360.

† Phil. Trans. 1835, p. 301.

Did our limits allow, we should here proceed to notice the most recent additions which have been made to our knowledge of animal organization. We might pursue the subject through each department of the science, and show the endeavours which were being made to advance its progress, as connected with the two principles above alluded to. But we can scarcely do more than make a few general remarks on this head, referring for illustration to the more important instances. And first, we are called upon to notice the increased attention paid at the present day to the structure of the more minute and delicately-formed animals; and the discovery, uniformly following, that this structure is not by any means so simple as was generally supposed formerly. This remark bears especially upon the *Infusoria* which have been so profoundly studied by Professor Ehrenberg. We need not speak of the first two memoirs by that acute observer on these animals, which are probably well known to all our naturalists. We may, however, allude to a third, published more recently,† in which he announces the existence of several systems of organs which he had not previously detected in this group.—Thus he has discovered in the *Polygastrica* a pharynx and teeth, the absence of which he had formerly considered as a distinctive character of that division. He has also observed what he is inclined to regard as male sexual organs, and likewise a gland secreting a deep blue-coloured liquid supposed to be the pancreatic fluid. In the *Rotatoria* he has noticed certain internal organs resembling branchiæ, and, what is a yet more important step, apparently distinct traces of a nervous system. It is curious to reflect, as Ehrenberg himself observes, with reference to the combined discoveries announced in this and in his two former memoirs, that he has been thus led successively to detect in the smallest animals which can be perceived with the assistance of the microscope, all the systems of organs which form the essential part of the human structure; and that these organs are not rudimentary, but, after their kind, as perfect as they are in man. It would seem as if but one type pervaded the whole animal kingdom, which, however modified in different groups, was capable of being traced from man downwards to the *Rotatoria*, and even to the *polygastric monad*. Hardly less striking than in the case of the *Infusoria*, is the astonishing accuracy with which the German naturalists have investigated the structure of the more minute *Entozoa*. We may refer to M. Nordmann's work [*] as evincing the patience with which these researches have been conducted in the instance of certain parasitic worms found in the eyes of some of the higher animals. The whole group is one which stands much in need of further examination; and we are glad to find that it has recently engaged the attention of one of our own countrymen, Mr Owen, who has suggested several hints for a better arrangement of its heterogeneous contents.[†] Although not in all cases offering any difficulty to the anatomist in respect of their size, we have already alluded to the *Acalepha* as possessing an extremely delicate and transparent organization. M. Ehrenberg has availed himself of this very circumstance for employing the same method of examination in this class, already so successfully resorted to in that of the *Infusoria*.[‡] By means of indigo, used for colouring the water in which these animals were preserved, he has detected the existence of anal openings, which, previously to this experiment, were thought wanting. The same observer has satisfied himself, that, notwithstanding their supposed simple structure, they possess branchiæ, eyes, muscles, and nerves. It will be remembered that these last had been previously discovered in the *Acalepha* by Dr Grant.[§] The species principally examined hy Ehrenberg was the *Medusa aurita*. In the same paper containing the result of his researches, are detailed some observations on the structure of the *Echinodermata*.—Allusion has been also made to the *Polypi*, as a group which, until lately, had been much misunderstood, owing to our slight acquaintance with their internal organization. Milne-Edwards, to whom we are mainly indebted for removing part of the obscurity which hung over these animals, has made them the subject of two new memoirs read to the Royal Academy of Sciences at Paris during the past year. We must refer to the memoirs themselves for some interesting particulars connected with the structure and economy of these animals.* We can only state here, that, according to the researches of that gentleman, the former offers three very distinct modifications, of which two only belong properly to the type characteristic of the *Radiata*. In these two he has traced an organization gradually becoming more and more simple from the *Actiniæ* and *Beroes* down to the *Hydræ*. The third series opens a passage from the *compound Ascidiæ* to several of the *Infusoria Polygastrica* of Ehrenberg.

---

* Ann. des Sci. Nat. tom. xv. p. 5.

† An abstract of this memoir will be found translated into French, in the Ann. des Sci. Nat. (Second Series.) tom. iii. pp. 281 and 363; and into English, in the Edin. New Phil. Journ. vol. xx. p. 42.

---

[*] Mikrographische Beitrage zur Naturgeschichte der wirbellosen Thiere. Berlin, 1832. 4to. Some extracts from this work will be found in the Ann. des Sci. Nat. for 1833, tom. xxx. pp. 268 and 373.

[†] See Proceed. of Zool. Soc. 1835, pp. 23–28; and pp. 73–76.

[‡] See Ann. des Sci. Nat. 1835, tom. iv. p. 290.

[§] Zool. Trans. vol. i. p. 10.

When speaking of the importance of studying animals at different periods of their growth, we pointed out certain groups in which striking changes of form had been observed to take place, approaching more or less to the nature of metamorphosis. The desire to investigate further these structural changes forms another prominent feature in the memoirs of the present day. The *Cirripeda* and *Crustacea* have excited particular interest on this head. It is well known that Mr Thompson was the first to announce the existence of metamorphosis in each of these two classes, a fact which has been since confirmed by others as regards the *Cirripeda*, but which is much doubted by naturalists as regards the *Crustacea*. During the past year, two memoirs have appeared from the pen of this gentleman devoted respectively to these two subjects. The object of the first † is to make known the discovery that the *Lepades* are, like the *Balani* (to which last his former researches alone extended), *natatory Crustacea* during the first stage of their existence, but of a totally different structure. The larva is said to resemble that of the genus *Cyclops*, or still more closely that of the *Argulus armiger* of Latreille. Mr Thompson is uncertain how long the *Lepades* remain in this their first or free state, but thinks that it is for a longer or shorter period, according as they may happen to meet with a substance adapted to their habits, to which they can attach themselves. In his second memoir, Mr Thompson treats of the *Crustacea*; and his object is, not merely to confirm his former statements respecting the existence of metamorphosis in this class, but to announce the startling discovery that these animals, before attaining to their perfect form, undergo *two* marked transformations, analogous to those experienced by the true insects. ‡ It will be remembered that the first state in which the *Crustacea* appear, according to the views of this naturalist published some years back, is identical with the genus *Zoea* of Bosc: the second is here affirmed to be the genus *Megalopa* of Dr Leach. The species in which this double metamorphosis has been more particularly noticed is the *Carcinus Mœnas.*[*] We have said that doubts exist respecting the accuracy of these observations. It is rather singular that in the same volume in which Mr Thompson's paper is contained, there should be also one by Mr Westwood, who is opposed to the views of that gentleman, and who, in our opinion, has very much shaken the grounds for believing in the existence of any metamorphosis at all. Mr Westwood has not only shown that Mr Thompson's statements are too vague and indefinite, and his observations too deficient in details, to be accepted as conclusive of this question, but he has brought forward some observations of his own of a directly contrary nature. From specimens of the female of the West Indian land crab, he has obtained both eggs and young, some of the latter being evidently just hatched; and he finds these young, as well as the embryo in the egg, bearing the exact form of the adult animal. It may further be added that Mr Westwood has found the young of the common crab of a much smaller size than Mr Thompson's supposed full-grown *Zoea* which died on the point of undergoing its supposed metamorphosis.[†]

---

* See L'Institut, 1835, pp. 10 and 152. Also Ann. des Sci. Nat. (Second series.) tom. iv. p. 321.

† Discovery of the Metamorphosis in the second type of the *Cirripedes*, viz. the *Lepades*, completing the natural history of these singular animals, and confirming their affinity with the *Crustacea*.—Phil. Trans. 1835, p. 355.

‡ On the double *Metamorphosis* in the Decapodous Crustacea, exemplified in *Cancer Mænas*, Linn.—Phil. Trans. 1835, p. 359.

In reviewing the memoirs which have appeared of late years in illustration of the structure of animals, there is yet another circumstance which merits our attention; and that is—the endeavour to elucidate the affinities even of those belonging to the higher classes, by having recourse to anatomical investigation. The importance of this step in the case of the *Mollusca*, and of other tribes occupying a low place in the scale of organization, has been already alluded to, and for some time been duly appreciated by naturalists. But, comparatively speaking, it is only more recently that such researches have been extended to the *vertebrate* and *annulose* animals, with an express view to the object above-mentioned. To enter into any detailed analysis, or even to particularize the titles of the different memoirs which have appeared of this character, would lead us beyond the limits to which we must necessarily restrict this article. But we wish to make a few general remarks on this subject, in reply to those who apprehend any detriment to the science of Zoology from the dissections of the comparative anatomists. We are not, then, of the same opinion with these individuals. We rather think that the further we push our inquiries into the real structure of animals, the clearer views we shall get of their organization as a whole, and of the relations which subsist between their internal and external characters. We allow that these last are what the Zoologist has to deal with more particularly. But let it be remembered, that before he can employ them rightly, he must know their true value; and this can hardly be determined, except he possess an acquaintance with those concealed organs, and their respective functions, of which they may be considered as the outward signs or indices. Let us assume the case of two allied species, in which we observe slight differences in certain external characters! and let us suppose that on dissection we find corresponding differences in those internal organs, between which and the former there is an acknowledged relation; as in the instance of the teeth and the alimentary canal. Let us, again, assume another case, in which we find these differences existing in the former only, there being nothing analogous to them in the latter. Now, under such circumstances, should we not infer rightly, that this slight modification of external structure had a more determinate value in the first, than in the second, instance; and is it not clearly a result, to which nothing but anatomy will conduct us? It is, in fact, this subordinate science which has led us to a right understanding of some of the primary groups among the higher animals, and it is only by the same help that we can ever hope to perfect the details of their arrangement. There was a time when bats were considered as birds, and whales as fish; and lizards were classed with quadrupeds simply because they possessed four feet. These errors, it is true, have been long exploded; but we wish it to be borne in mind, that it was not until naturalists had ascertained the real organization of these animals, that the absurdity of them became apparent. It was then seen that external form, or mere analogy of habits, considered singly, was no sure guide to the knowledge of true affinities. Now the question is—whether this principle which is thus necessary to be remembered on our first attempting to group animals according to their natural relations is ever to be abandoned afterwards? After having made good in this manner our first steps, can we safely trust to any different reasoning for insuring our progress? It is clear that the errors we may commit by so doing will be less glaring than those above-mentioned, in proportion as we have to deal with slighter differences than those which separate two distinct classes of animals. When the question is reduced to—whether two animals belong to the same species, or whether two species can rightly be referred to the same genus, we can but commit an error of one or a few steps, which, when detected, will excite but little notice. Nevertheless, we believe that we should much lessen all chance of error, by knowing the whole structure of the animals before us. In the present state of the science, it is necessary to have recourse to very subtle external distinctions for characterising genera and species. But their very subtility is an argument for enquiring as far as possible into their true value; and it remains yet to be shewn, that there are not, at least in many cases, as subtle distinctions to be found internally, with which the former are associated, and which, being known, tend to raise their importance. It is, then, on these grounds that we rejoice to see so much endeavour at the present day to elucidate the internal organization of animals. Much has been done in this respect by the Zoological Society, which affords to naturalists the double advantage of studying the habits of those animals which it possesses while living, and of investigating their anatomical structure when dead. We need only refer to the Proceedings and Transactions of that scientific body, to see the advance which has been made of late years in this very important department of Zoology.

---

[*] On the supposed existence of *Metamorphosis* in the Crustacea.—Phil. Trans. 1835, p. 311.

[†] Zool. Research. p. 9.—It may not be out of place to mention here for the information of our own naturalists, that the supposed *Metamorphosis of the Crustacea* has been recently proposed as the subject of a prize-essay by the Academy of Sciences at Haarlem.—See L'Institut, 1835, p. 272.

But there are other grounds upon which we may take up this argument. Comparative Anatomy is of service to the Zoologist, not merely for helping him to the true value of external characters, but in some cases for determining the actual nature of those external organs from which these characters are derived. As an instance in point we may refer to a remark lately made by Professor Agassiz respecting the supposed affinity of the *Cyprinidæ* to the *Siluridæ*. It would seem, says he, that "from the bearded *Carps* to the bearded *Siluri* there was a natural transition by means of the bearded *Loaches;* but it is important to distinguish that in these latter, as well as in the *Carps* and other *Cyprinidæ*, the beards, as they are called, are merely processes of the skin; while in the *Siluri*, the *cirri* of the angles of the mouth are actually prolongations of the maxillary bones becoming gradually cartilaginous and tapering into thread-like extremities." * This appears, then, to be a case, in which naturalists had supposed two external organs to be of a similar nature, which, upon dissection, prove different. We do not assert that the affinity between these tribes has been grounded solely upon the presence of such organs: we simply inquire, whether our views are not necessarily a little modified on ascertaining the true organization of those parts from which we have hitherto drawn some of our characters; and whether, on combining the result thus obtained with the results of a more extended anatomical investigation, it is not at least possible, that the relation of supposed affinity may prove eventually to be one of mere analogy.

---

* Proceed. of Zool. Soc. 1835, p. 150.

The only instance in which anatomical researches have been misapplied, as regards Zoology, is that in which they have led to the formation of systems based upon certain parts of the internal structure of animals, without regard being paid to the relation in which these parts stand to the rest of the organization, and the consequent degree of influence which they exert over the economy. This has been sometimes attempted by persons, who have generally been good anatomists, but ignorant of the first principles of Zoology. Yet even these systems are not entirely without their use to the naturalist.—Although worthless as a whole, they may suggest certain affinities which might otherwise have been passed over. They at least teach us the method of variation of those organs upon which they are established; acquaint us with their true value; and throw more or less light upon the real relations which subsist between those characters which anatomy furnishes, and those with which Zoology is more immediately concerned.

But it is time that we pass from these remarks to inquiring into the present state of the science, as regards that, in which the scientific Zoologist is so much interested,—a natural classification of animals.

And here we must state, that it is not our intention, neither would it be practicable within the limits of this article, to analyze in detail any of the numerous systems which have been brought forwards of late years. We simply purpose making a few observations on the views which naturalists seem to entertain on this subject. The most important feature in the present times is—the endeavour, now made almost universally, to refer the affinities of animals to some fixed principles of arrangement,—some general plan determined by certain laws. We can hardly doubt of there being such a plan, upon which the Great Author of Nature has formed the innumerable creatures which people the earth. When we see the harmony which pervades the rest of his works;—when we become acquainted with the beautiful laws which have been discovered in other sciences;—when, especially, we call to mind the principles established in those which border most closely upon Zoology;—we can hardly but conceive, that this science also admits of some generalizations, and that animals are as much under the influence of given laws in respect to their affinities, as they are in respect to their structure. Now it may be true that the first idea of the existence of such a plan belongs to a much earlier period than the present; and that Linnæus, and even the older naturalists, had some faint notions upon this subject; but, until the close of the last century, there was hardly any attempt made to elucidate its principles; and only quite recently has this attempt, with some few exceptions, become general. The reason is obvious. The science had not made sufficient progress to warrant the endeavour. And for the same reason, it is obvious we must await the arrival of many years to come before we can hope to see that endeavour perfected. We are not, then, surprised to find, that although naturalists are everywhere pursuing the same object, they are following very different roads in the hope of attaining it. We should wonder if it were otherwise. When we think of the immense field which Zoology lays before us,—of the comparatively small portion of that field as yet explored,—and of the impediments which arise to make our path difficult;—when we reflect further, how much is required to determine the exact relations of a single group,—and how often we are left to mere conjecture and analogy, in the absence of facts, which can alone establish our reasonings on a sure basis;—we are prepared to meet with much variety of opinion upon such a subject. It is, indeed, more than probable that the classification of animals is destined yet to undergo, at least in part, great and important changes.* The views of naturalists will differ, according as they have paid most attention to this or that department of the science, in each of which, from the unequal progress of our knowledge, we appear to recognize the influence of distinct principles. Their minds, too, will receive, unconsciously to themselves, a slight bias, arising from the nature of their other studies, or of those which led them to the particular study of which we are here speaking. It is only time which can do away with the erroneous conclusions of a partial or a prejudiced judgment. Contrariety of opinion originating in the above sources, is for a season unavoidable; and we must wait patiently till we have received sufficient light to determine those questions, with respect to which naturalists are so much at issue.

But independently of what has been above-mentioned, there is another and distinct ground of difference observable in the attempts which have been made of late years to arrange animals upon some uniform plan. In fact, as has been recently said,† there are two distinct principles upon which we may proceed, each being in accordance with certain obvious relations existing in nature. We may either take for our guide the principle of the subordination of characters, successively grounding our divisions upon modifications of structure becoming less and less important as we proceed downwards; or we may seek to distribute animals into as many principal groups as there are well-marked series, each of these series being characterized by a peculiar type of organization gradually becoming more and more simple in its descent. The former of these principles is that which was first developed, and so strenuously upheld, by the great Cuvier, and which is still adhered to by a large proportion of the naturalists in France and in our own country. The latter may be distinguished in many of the systems which have appeared in Germany, as well as in some which have emanated from other quarters. It may be said, that, as there can be but one natural system strictly speaking, it is impossible that both these principles can conduct to true results. This would be correct if animals exhibited only one *kind* of relation to each other. But we know that they exhibit more than one; and hence we are not without hope, that, notwithstanding the opposite nature of these principles, the day may come, in which it will be found possible to reconcile the views to which they have respectively given birth. We, in fact, are inclined to think, that some slight approach to this reconciliation already shows itself in the theories of those naturalists who distinguish between *relations of affinity* properly so called, and *relations of analogy*. It does not follow, that the theories themselves, by which it is attempted to explain these relations, and to refer them to given laws, are necessarily correct. Which, or whether any, of them can be so regarded, is a matter for time to determine. We would here simply draw attention to a point which may hereafter prove in some measure a bond of union between two conflicting opinions of the present day, and conduct at length to truths of which it will be then found that each party had some faint glimmerings.

---

* We may mention in this place, that a new arrangement of the Animal Kingdom has been recently brought forward by Professor Ehrenberg of Berlin. It is divided into 29 classes founded on the organization, and on the general existence of one type of structure, as respects the system of sensation, circulation, locomotion, nutrition, and reproduction.—See L'Institut, 1835, p. 305.

† Lam. Hist. Nat. des An. sans Vert. (2d edit. 1835.) tom. i. p. 336.

There is another circumstance which tends to confirm our hopes that naturalists are approaching gradually to some just and uniform results, and which merits notice. And that is, that, notwithstanding the diversity of their views respecting the details of systematic arrangement, —there may often be observed certain features of resemblance (not of identity) in the general principles from which they set out. This resemblance may be especially traced in two very different schools established in Germany and in our own country respectively. Thus, for instance, the principle first laid down by Oken, that the classes of the animal kingdom are severally characterized by the particular development of some one of the animal functions, and that these characters are continually reproduced in the subordinate divisions, causing each group to contain representations of those above it together with its own peculiar type;—this idea offers some analogy to the "Theory of Representation" of Mr Swainson,[*] which is itself only an extension of one of the views adopted by Mr Macleay.[†]—We may also refer to the idea, that the subordinate divisions of every natural group are controlled by some fixed number,—as another point of resemblance in the two schools. This principle, indeed, seems to follow from the one just mentioned as a necessary consequence, since if two groups do not contain exactly the same number of divisions, it is impossible that the larger number can be all duly represented by the smaller.

We must observe in this place, that, in making the above remarks, we do not wish to be considered as upholding the particular views of either school just alluded to; much less the details of those systems, which they respectively advocate. We are simply adverting to a certain similarity of principle which pervades them both. That animals do appear, in a multitude of instances, to represent, as it were symbolically, others, with which they are connected by no immediate affinity, must have struck the most inattentive observer. It is also in the highest degree probable, that these relations, as well as all others, are in accordance with some fixed laws. But whether these laws will be found in the end exactly as they are laid down by either of the parties above referred to,—whether by making some slight modification in either of their peculiar theories, or by combining their principles in any manner,—we may be able to attain ultimately to some result, not very different from the results at which they have respectively arrived;—these are questions, which, as we said before, time only can determine. We are aware that this assertion will appear somewhat strange to Mr Swainson, who has recently developed more at large his modifications of Mr Macleay's theory,[‡] and who considers his own first laws as established upon incontrovertible evidence. But with all deference to the talents of that distinguished naturalist, and with every wish to receive the truth, when it shall be proved to the satisfaction of unprejudiced minds, we cannot entirely accede to this opinion. Mr Swainson does not seem to be aware of the existence of a school of naturalists in Germany,[§] who profess equally with himself to refer the classification of

[*] Faun. Bor. Am. part 2, p. xlviii.; and Classific. of An. p. 236.

[†] Hor. Entom. part 2, p. 518.

[‡] See his Preliminary Discourse on the Study of Natural History. Lond. 1834. Also his Treatise on the Classification of Animals, 1835.

[§] We infer this from the circumstance that no notice whatever is taken of this animals to some *general* principles, and who are equally satisfied with him, that they have attained to a knowledge of these principles in the main. We mention this, in order that it may not excite his surprise, if those who attach themselves to no particular party should consider one set of principles as much entitled to their regard as the other, and should withhold from both, at present, their unlimited confidence. We should be sorry to be thought to offer any opposition to those which Mr Swainson advocates. We simply wish to see them better substantiated, than, in our opinion, and, we believe we might add, in that of a large proportion of the naturalists of this country, they are at present. With respect, in particular, to the law of circular affinities, it is undoubtedly true, that many groups, which have all the appearance of being natural, evince a decided tendency to such an arrangement, and, reasoning from analogy, it seems highly probable that this principle may extend throughout nature; but let us investigate the affinities of animals more closely, of those especially, which, being low down in the scale of organization, have as yet obtained but slender attention from naturalists, before we consider this point as resting upon anything like "*mathematical certainty.*"—In fact, the supposed proof of this principle is involved in the fate of two others:—that which assigns a definite number of subordinate divisions to each group,—and that upon which depend those symbolical representations of which we have before spoken.—The whole theory may, in short, be said to rest upon relations of analogy conforming to an apparent law, these relations themselves, however obvious in certain cases, being, when remote, so obscure as to be hardly palpable, when very near, so striking, that, according to Mr Swainson's own shewing, there is danger of confounding them with relations of affinity.* We would not willingly assert, that Mr Swainson has suffered his own judgment to be warped by an active imagination. But certainly we must say, that some of the relations which he has pointed out are such as we conceive few besides

---

school, either in his Treatise on the "Rise and Progress of Zoology," (Prelim. Disc. part 1.) or in a subsequent Treatise on the "Rise and Progress of *Systematic* Zoology;" (Classific. of An. part 2.) We are inclined to think that the Germans are equally strangers to the school founded in England by Mr Macleay, since we find M. Agassiz adverting to the "philosophic naturalists" of Germany, as those who *alone* have sought after *general* principles.—See Notices of Com mun. to the Brit. Assoc. 1835, p. 67.

* Speaking of analogical relations, Mr Swainson observes;—"In proportion as groups approximate, other dissimilarities of course become less, so that when we descend to genera which follow or come very close to each other, it is impossible to decide, at first sight, whether the relationship be one of analogy or of affinity."—Prelim. Disc. &c. p. 215.

himself can distinctly appreciate; that, at any rate, points, with respect to which there exists any ground for difference of opinion, can hardly be advanced in proof of a theory, whatever there may be to render that theory *probable*.

In fact, we believe the time is not yet come, in which it is possible to *demonstrate* the truth of any theory whatever. We may shew the apparent influence exerted by certain principles which seem capable of being deduced from the data already in our possession; but we conceive that we must be more acquainted with the structure and affinities of animals, before we can establish such principles upon a sure basis. Nevertheless, we would not discourage persons from making the attempt. We are rather inclined to let all naturalists hold their own opinions on this subject, convinced that truth will work its way in the end, and that, if not found in exact agreement with what they had anticipated, it will at least have received some light from their researches.

In the meanwhile, those who keep aloof from speculations of the above kind should endeavour to enlarge the bounds of our positive knowledge as regards this science. Let them investigate some of those departments, to which so little attention has been as yet given, and try to place the several ramifications of the great system of nature upon a more equal footing. By so doing, they will supply sound materials for such as choose to speculate upon the exact plan on which that system is constructed, at the same time that they help the science forwards to that point, which, when arrived at, the plan will in some measure develop itself. For it should be remembered, that there are two distinct objects to be attained, as regards the natural system:—"first, the arrangement of all animals according to their true relations; and then the discovery of those general principles (assuming that there are such) by which these relations are governed."* Now had we already effected the first of these objects, which can only be the result of a rigid analysis, extended to all the groups of animals with which we are acquainted, we should probably have little difficulty in evolving the latter. At present, however, this has been but very imperfectly done. And, perhaps, we are more likely to proceed rightly in this matter, when we go to work unfettered by any theoretical views, which in our anxiety to uphold, we are liable to have our judgment biassed to a degree to which we ourselves are totally unconscious. It is, undoubtedly, at all times agreeable to true philosophy to ascend by inductive reasoning from known facts to general principles: It is undoubtedly allowable, without waiting for the acquirement of all possible facts that can be obtained, to try any theory which explains those already in our possession, by applying it to such as may be observed afterwards. But the danger is, in the science now before us, especially when we have to deal with analogical relations, that we *mistake for facts*—points, which may certainly appear as such to us, but which are of that nature that they *must* infallibly strike different observers in different lights according to the impressions upon the mind at the time of viewing them. Hence it is that we conceive, that we are more likely to see these relations truly, when we have no theory to support;—when there is nothing which is likely to warp our judgment. We believe that if we made it our first endeavour to arrange all animals according to their best ascertained affinities, at the same time noting any other less obvious relation; and if we then drew lines of separation between such groups as appeared well characterized, taking care to assign to each a rank proportioned to its true value; we should gradually arrive in this manner at as just a conception of the true order of nature as, perhaps, it is possible to attain.* For, after all, it becomes a question, whether, assuming that there is some definite plan in nature grounded upon fixed principles, we can ever hope to understand more than part of it. When we consider how much is requisite to complete the history of a single species, and that we need to be acquainted with this history, not only in the case of all existing animals, but of all lost ones also,—we may conceive how vast must be the task of tracing the relations which one species bears to the others. We can scarcely do more than make some approximation to the truth.—We can only arrange our groups in such a manner, that there be no other known ones more nearly allied to be brought in between those which stand next each other. And the system which does this may be called natural, † although it may not serve to elucidate all the laws by which the exact plan of nature is regulated.

---

* The above passage will be found nearly similar to what Mr Swainson has expressed at p. 200 of his Preliminary Discourse.

---

* The above will be found nearly in accordance with Lamarck's judicious observation on this subject, which it may be well to repeat here. He says,—"Nous avons senti que, pour réussir à établir une bonne *distribution* des animaux, sans que l'arbitraire de l'opinion en affaiblisse nulle part la solidité, il était nécessaire, avant tout, de rapprocher les animaux les uns des autres, d'après leurs rapports les mieux déterminés; et qu' ensuite, l'on pourrait, sans inconvénient, tracer les lignes de séparation qui détachent les masses classiques, ainsi que les coupes subordonnées, utiles à établir, pourvu que les rapports ne fussent nulle part compromis par la composition et l'ordre de nos diverses coupes."—Hist. Nat. des An. sans Vert. (2d edit.) tome i. p. 285.

† This remark is Cuvier's· but we are unable to refer to the exact place in which it is expressed.

We would here briefly remind those who enter upon the investigation of the natural affinities of animals, of the importance of being guided by certain acknowledged principles,—quite independent of those general laws above alluded to, indeed independent of all theory whatever, and equally deserving our regard, whether we incline to any theory or not. They respect the *value of organs* and the *subordination of characters.* Except we set out in our enquiries with some definite ideas on these points, we shall be perpetually falling into error. In order to discover the true affinities of animals, it is not sufficient that we compare their respective characters,—and then note what marks of resemblance are to be traced between them :—we must first ascertain what is the relative value of the different organs, which furnish those characters. And how is this to be determined?—By observing which organs exercise the most important functions, or are of most general occurrence. It will be found on such an enquiry, that some appear to take the lead of others,—that while some are constantly present, others are often wanting,—and that even among the former, we may trace, in different instances, very different degrees of variation. Now by paying regard to these circumstances, we establish gradually that subordination of characters, to which we have before alluded as first employed in this science by Cuvier, and which must be the basis of all natural classification. Our limits will not allow us to enter at any length upon this subject, or we might advert to certain rules, founded—partly upon observed facts—partly upon common principles of reasoning, which have been drawn up with reference to these enquiries, and which ought to be well studied by the Zoologist. * We regret, indeed, that, in some instances, they have not been more attended to. Had it been otherwise, we should not see so many conflicting opinions respecting classification ;—we should not see groups of very unequal value placed exactly upon the same footing,—genera founded upon the most trivial distinctions, and such as are connected with no peculiarity whatever of habits or economy,—in short, so little attempt made to ascertain the limits of variation in the case of those characters to which recourse is had for the purpose of systematic division. There is one observation in particular we would wish to make, the truth of which must be apparent to all who have paid the least attention to the structure of animals; and that is,—that organs of the same kind, and performing exactly the same functions, do not necessarily afford characters of the *same* value in *different* groups. This circumstance has been much overlooked. We not unfrequently see naturalists taking as the basis of their arrangement a system of organs, which, in certain classes, are universally allowed to be of the first importance, but which, in the group under their consideration, are subject to such modifications, as clearly indicate the subordinate influence which they exert over the economy. We might point out several instances in which this error shows itself. We shall, however, content ourselves with referring to the *pulmonary* and *trachean Arachnida*, which have been made distinct classes by some naturalists, on the ground of differences in their respiratory organs, which they would seem to think entitled to as much regard in the case of the Annulose animals, as all allow them to deserve in that of the Vertebrate.

---

* Many of these rules apply equally well, or with some slight modification may be made applicable, to the two sciences of Zoology and Botany. On these grounds, we strongly recommend to the attention of naturalists some portions of the Théorie élémentaire de la Botanique of M. Decandolle, where they are laid down with more clearness and precision than in any zoological work with which we are acquainted. The student, however, may consult with advantage the seventh part of Lamarck's Introduction to his Hist. Nat. des. An. sans Vertèbres, divesting it of those peculiar theoretical views which pervade the whole of that volume.

The subject of the value of characters is closely connected with a question of great importance, and which, in the present state of the science, calls for particular investigation. What are the limits of variation assigned to *species?* We conceive this to be a problem, to which, in these days, we shall do well in directing the attention of naturalists. We need hardly say how general has been the complaint of late years, that species are now multiplied to an excess, quite overwhelming to those who wish to enter into the details of the science, and bidding fair in time to exhaust all the resources of a pure and correct nomenclature. It is undoubtedly true, that to distinguish and point out even the slightest variation of character in animals is of importance, not merely as helping others to identify those which have been the subject of our observation, but as a necessary step to a knowledge of their true affinities. We are, however, only half completing this matter, if we stop there, without proceeding to enquire whether these variations are due to a specific difference, or whether they may have resulted from the action of external or other causes. The evil above alluded to has taken deep root enough in our own country; but in Germany it would seem to have attained to a yet greater pitch. M. Brehm, an ornithologist well known for the extent to which he has multiplied the birds of Europe, a few years back attempted to establish no less than *seven* species of *Loxia*, or true Crossbill, as natives of Germany.* The same observer has made three species out of *Columba livia*; three out of *Emberiza nivalis*; two out of *Anas glacialis*; two out of *Larus marinus*; the same out of two other species in that genus; two out of *Procellaria glacialis*; besides many more which it would be tedious to enumerate. When we find opinions of this nature entertained, and we imagine it would not be difficult to adduce similar examples in the other departments of Zoology, can we believe that due attention has been paid to those variations of character, which we see constantly arising from local or accidental circumstances in other species, and which in these last we can indubitably trace back to such causes only? With respect to birds in particular, we cannot be too cautious how we place reliance upon mere variations of plumage; over which we know so great an influence to be exerted by age, sex, season, and have ground to suspect, in certain instances, also by climate. We know, moreover, that some of the changes arising from these causes are themselves liable to irregularity from any accidental circumstances affecting particular individuals. This is especially the case with those due to differences of age, as has been proved by rearing birds in confinement. It has been observed that, under such circumstances, an interruption often takes place for a longer or shorter period, possibly in some few instances an entire suspension, of laws, which would otherwise operate uniformly for each species respectively. Thus it is mentioned by F. Cuvier,† that *Gulls*, which in a state of liberty would naturally mature their plumage at the end of the second or third year, have been known in captivity to require one or two years more for that purpose. Analogous facts have been observed in our own country. With respect to the influence of climate in bringing about a permanent difference of character in certain species, as compared with the same species found in other latitudes, it is a subject upon which little positive information has been yet obtained. We may, however, fairly contend that the thing is possible, if not highly probable, till some direct arguments be adduced against it. Assuming, as a fact, that season and temperature cause periodic changes in the plumage of some species; it seems highly probable, that any thing which occurs to disturb the regularity of the seasons or to affect their general character, may affect, in like manner, the regularity of such changes, or at least modify the extent to which they are carried. Now any particular season departing from its usual character in this manner, may exhibit, while it lasts, the *permanent* character of a distinct climate, in which may occur the same species of bird with its plumage, consequently, from the action of that climate, *permanently* modified. We regret that, in relation to this subject, we have it not in our power to consult a memoir which is said to have been presented nearly two years since, by M. Gloger to the Berlin Academy, treating expressly on the modifications induced by climate on birds. We may, however, quote a remark by M. Jacquemin, which leads us to think that the above idea is far from problematical. He says, in allusion to M. Gloger's memoir, that its author "has demonstrated in such a manner as to leave no doubt, that individuals of one and the same species of bird present different arrangements of colouring according to the climates which they inhabit, and that one and the same individual, amongst the birds of passage, changes during nearly the whole year the colours of its plumage, according to the different climates through which it passes."* If this be true, the question is, indeed, nearly at rest. Or it is reduced simply to an inquiry into the *amount* of influence produced by such a cause; and till some endeavour has been made to assign the limits, the fact itself may well make us sceptical respecting many of the species found in distant latitudes, which, although presenting *the closest affinity* to some in Europe, have been considered as distinct by naturalists.†

---

* Bull. des des Sci. Nat. 1828, tom. xiv. p. 259.

† Ann. du Mus. tom. xi. p. 285.

We have dwelt so long on the above subject, that we can hardly pursue the question first adverted to, as regards the limits of species, through any of the other classes. In some of these, we may observe variations not of colour only, to which, in the case of birds, such variations are generally restricted, but, to a less extent, of form and sculpture also, which may be due to causes of which as yet we understand little or nothing. Generally speaking, differences of this nature are more to be depended upon than those of mere colour; but even these cannot always be trusted as indicating a distinct species, until after examination of a large number of individuals. We shall then see how far such variations retain their constancy; and whether there may not be found specimens of an intermediate character serving to connect the more extreme cases, and thus clearly proving all to be of one species.

---

* Ann. des Sci. Nat. 1834, tom. ii. p. 279.

† These allied species have been considered different, principally on the ground of their inhabiting such different geographical positions. But there is reason to believe that too great importance has been attached to this circumstance, and that the power of acclimation possessed by many birds is more considerable than naturalists are inclined to suppose.—See a few remarks on this subject, accompanied by a list of Birds common to various parts of the world, by Lieut.-Col. Sykes. Notices of Commun. to the Brit. Assoc. 1835, p. 69.

From experiencing the great difficulty which attends the exact discrimination between species and varieties, especially in certain groups in which variation of character is very frequent, some have imagined that there was nothing definite or constant in species themselves, but that they passed insensibly into one another. To this opinion, although embraced by many eminent naturalists, we are strongly opposed. It may be true that hitherto no definition of a species has been brought forwards which will meet all cases; but until our means of observation shall have been more extended than they have at present, this simply proves the imperfect state of our knowledge on this subject. For let us consider how much is wanted to enable us to fix such a definition with certainty. It has been observed with reference to this point, that " we ought to see species in all their several localities from north to south; to get together all the varieties of age, form, colour, and size, in order to construct from all these modifications a table representing one well-known species, and to establish as many of these tables as there are true species of organized beings. By these means we should probably arrive at some law which would fix the limits of the species in its modifications, and serve consequently as the basis of an exact definition."*

Having brought our remarks to this point, we shall simply, before concluding, say a few words for the direction of those, who may be entering on the branch of science we are here considering. We have more than once alluded to the immense field which Zoology brings before us. We have also noticed the great partiality shown by naturalists towards certain parts of that field in preference to others. Now what we would recommend to such as really desire to advance its progress,—is,—that they restrict their chief attention to some given department, and, when practicable, to those particular groups which have been least studied. It is utterly out of our power to become acquainted with all the existing species of nature. The longest life, added to the enjoyment of the most favourable opportunities, will not suffice for acquiring more than a very limited knowledge of the details of their history. It must, then, be by division of labour, that we try to perfect the science, so far as human researches can perfect it. We must bring our observation to bear on those parts of it which are behind the others,—we must apportion such parts amongst us according to the respective circumstances in which we are placed, and then, by combining afterwards the results obtained separately in this manner, we may one day be in a position to form some judgment of the true natural system. But, before selecting our particular field of observation, it is very desirable that we take, as far as possible, a general view of the whole subject. This is requisite, in order that we may get some idea of that uniformity of plan which pervades more or less the entire animal kingdom, and of that complicated chain of affinities by which its several divisions are held together. Hardly any group is circumscribed by such absolute boundaries, as to admit of being viewed correctly, except in connection with all others to which it bears any kind of relation. It may not be necessary to study these others in detail, but without some knowledge of them, we shall hardly prosecute successfully our own department. Except we have some acquaintance with other structures, we shall hardly set a right value upon those modifications of structure which come before us; and except we see something of the affinities of other animals, we shall hardly arrange according to their true relations those with which we are concerned. We shall especially overlook those approaches to the organization of contiguous groups by which is effected a passage from one to another, and those partial resemblances, or relations of analogy, which may be so often (some think always) traced between corresponding parts of two parallel series.

---

* Lam. Hist. Nat. des An. sans Vert. (2d edit.) tom. i. p. 166.—Note by the Editors.

With respect to the particular groups, which, in the present state of the science, call most loudly for the attention of naturalists, we can only make a few remarks, supplementary to those which we have already made elsewhere.* We would observe, generally, that it is towards the bottom of the system that their exertions are most wanted. We as yet know but little of the classification of the *Invertebrate* animals, below the *Mollusca* and *Annulosa.* We may think that we can, with some appearance of truth, point out the leading divisions, or even proceed to the arrangement of the more subordinate groups; but every day is bringing to light some fresh discoveries calculated to make us mistrust those views which are founded more upon *a priori* reasoning than upon actual observation. We are so in ignorance of the real structure of certain families; we find others established upon characters of general resemblance, but offering internally such differences of organization;—that we can hardly say at present, with reference to these animals, on what systems of organs we can most rely as the basis of a natural classification, or indeed, in many instances, what organs are present. It is a question of dispute at this moment, whether those microscopic marine shells, which have been hitherto arranged with the *Cephalopodous Mollusca*, and in which class they stand as D'Orbigny's order of *Foraminifera*,—whether, after all, they do not belong to animals possessed of the very simplest organization, and such as brings them into close alliance with some of the lowest forms among the *Infusoria* of Muller.—Such at least is the opinion of M. Dujardin, whose memoir on the structure of these animals, published recently, is deserving of attention.* The same observer has been led by his researches to question the accuracy of even the brilliant discoveries of Ehrenberg with respect to the *Polygastrica*. He is inclined to think that the supposed alimentary sacs seen by that naturalist are simple vacuities formed spontaneously in the midst of a peculiar gelatinous substance † which enters into the composition of these animals, and through which the water is imbibed into these vacuities. He considers the existence of a mouth and anus as a mere illusion. Whether these opinions be right or not, they show that our knowledge of the structure of these groups, which is the only sure guide to their classification, is not yet upon a sure footing. And how many others are there to which the same remark is applicable? We might speak of the *Physaliæ*, by some classed with the *Acalepha*, by others with the *Mollusca*; ‡ or of the *Diphyæ*, those anomalous beings which we are at a loss whether to consider as simple or compound animals. We might allude to the strange discovery, recently announced by Mr Thompson, § that the genus *Comatula* is, during its young state, a species of *Pentacrinus*, to shew that even in tribes with whose structure we are better acquainted, there is yet much to be learnt as regards their history. Or, lastly, we might dwell on those extraordinary productions, which seem to baffle all our conjectures respecting their true nature;—which we know not whether to arrange with plants or animals, and which some have even regarded as forming an intermediate kingdom between the two. ‖ Who does not see, in these instances, and in many others which might equally be brought forward, an ample and almost untrodden field, in which the acquisition of only a few facts may lead to the most important discoveries.

---

* Report on Zoology, p. 249.

---

* See Ann. des Sci. Nat. 1835, tom. iv. p. 343.

† To this substance, which is said to be found in all the lower animals intermixed with the other elements of their structure, M. Dujardin gives the name of *Sarcode*.—See Ann. des Sci. Nat. 1835, tom. iv. p. 364.

‡ Referred to the *Mollusca* by Blainville.—See his Manuel d'Actinologie, (1834,) p. 112.

§ Edin. New Phil. Journ. No. 40, (April 1836,) p. 295.

‖ See the article Arthroidees in the Dict. Class. d'Histoire Naturelle.

We are not without hope that the above and other obscure tribes of animals, which have of late years attracted much notice from a few eminent observers, will continue daily to be brought more to light. We would also hope, that as there are already some in our own country who have devoted themselves to these departments, there will not be wanting others to join in the inquiry. The shores of Britain offer great advantages for the study of the marine *Invertebrata.* Those, especially, who are resident on the coast, have it in their power, not only to examine these animals in a recent state, but to follow up a series of observations on the same individuals, so as trace with accuracy the successive changes through which they pass before attaining to maturity. There are, however, many groups inhabiting fresh water not less deserving the attention of the inland naturalist. The field may be here more limited, but it is still extensive. Our rivers, streams, and ditches, abound with various forms of animal life; of which, if some, belonging to the higher classes, have been well investigated, there are others, low down in the scale of organization, offering a rich harvest to the attentive naturalist. It is here that we meet with the *Planariæ,* so remarkable for their singular modes of propagation;—the *Hydræ,* which have already immortalized one observer; —the *Vorticellæ,* imitating in exact miniature the most elegant forms of vegetable life;—the *Rotatoriæ,* so called from that astonishing mechanism by which they secure their prey, and to which it would be difficult to find anything parallel in other classes. It is here that we have the opportunity of searching into the real structure of the *Polygastric Infusoria:* it is here, especially, that we may investigate, in all their details, those ambiguous productions, to which we have already alluded, as oscillating, if we may so speak, between the two great kingdoms of organized beings.

In expressing a hope that before very long, we shall have much increased our acquaintance with the lower animals,—we have been guided by the circumstance, that many groups are now attended to by naturalists, which, till recently, have been very little thought of. A spirit of inquiry has arisen up amongst us, which is no longer content with treading in the old beaten paths. If Entomology, perhaps the most attractive branch of the science under our consideration, still usurps an undue share of the attention of naturalists, it is at least studied in all its several departments, and with a degree of zeal no longer restricted to the mere desire of accumulating rare specimens. It was observed five years back,* that the *Coleopterous* insects engaged alone two-thirds of the European Entomologists. We are inclined to think that there is no longer any ground for such an assertion. Sure enough in this country, whatever may have been the case formerly, it is now otherwise, Judging from the elaborate memoirs which have appeared lately, in illustration of some of the most minute and obscure families in different orders, it would seem as if each order had its own admirers, and as if they were all in the way to a progressive development of their contents. There is further a desire manifested to study certain groups which in bygone days the Entomologist seemed to think beneath his notice; as well as to extend inquiry to all the other classes of the *Annulosa*. We need only refer in illustration of this remark, to Mr Templeton's recently published memoir on the *Thysanura* of Ireland *—to Dr Johnston's on the *Myriapoda* of Berwickshire †—and to sundry memoirs on the *Crustacea* of the British Islands, to one especially on the *Entomostraca* by Mr Baird, ‡ which we believe to be nearly the first attempt that was ever put forward in this country to investigate the native species of this very interesting group. We hail these essays as indicating a very different spirit from that which prevailed amongst us a few years back. They lead us to anticipate the day, in which there will be found no lack of labourers willing to enter upon any portion of that immense field which Zoology presents to us, and which requires to be explored in its very darkest recesses, before we can make much approximation to the exact plan upon which it has been mapped and laid out by the Great Author of Nature.

---

* Bull. des Sci. Nat. 1831, tome 27, p. 102.

It is encouraging to those who engage in the pursuit of Natural History, to think—that, however restricted may be their situation or circumstances, however limited their opportunities and means of observation, they have it in their power to do something for the advancement of this science. They have only to direct their researches with care and accuracy, with patience, § with judgment, and with a never-failing regard for truth. Let them do this, and it matters not what department they take up. They may select any group, which they consider as best adapted to their means of study, or to which their inclination prompts them most strongly. It is, indeed, not easy to estimate the advantages that would accrue, if each individual were to do nothing more than to glean such facts as offered themselves to his notice.[*] It is observed by the great Cuvier,—that the "natural sciences are but collections of facts, and our theories only formulæ for embracing a large number of them: hence it follows, that the smallest fact, if well-ascertained, ought to be preserved; since if new, it may serve to modify our most approved theories: the most simple observation may overthrow the most ingeniously-constructed system, and open our eyes to a long train of discoveries, which had previously been concealed from view by received formulæ."[†]

---

* Entomol. Trans. part 2, p. 89.

† Loud. Mag. of Nat. Hist. vol. viii p. 486.

‡ Proceed. of Berwicksh. Nat. Club. p. 95.

§ We have a striking instance of patience exemplified in Ehrenberg, who, we are told, was *ten years* in conducting his experiments, before he succeeded in selecting a fit colouring matter to serve as nutriment for the *Infusoria*.—See Edinb. New Phil. Journ. 1831, p. 209.

With the above words,—the words of one whose judgment and great experience entitle him to be heard on such a subject, and who himself appreciated as it deserved even the smallest endeavour made to promote the advancement of the particular science we have been here considering,—we would conclude these remarks. It was in conformity with such views that he himself acted. He was not opposed to theory;[‡] but he knew enough to mistrust the theories of his own day, and to see the necessity of knowing more to establish their validity. He sought truth only; and truth is what we also should propose as the end of our researches. We may not all attain to the same brilliant reputation which he earned; or enlarge as widely as he did the bounds of science. But we may do enough to entitle us to the thanks of those who take a common interest with ourselves in these pursuits. We may throw our mite into the common stock. We shall at least reap the satisfaction which never fails to attend the study of Nature; and even if our labours should not conduct to any great or very important results, they will yet have been the means of opening to us an inexhaustible fund of rational occupation and amusement.

Swaffham Bulbeck, April 21, 1836.

---

[*] Many facts of great importance relating even to the most common animals, remain yet to be observed. Thus M. Prévost has thrown much additional light lately upon the habits of the *Cuckow*, and shown that, notwithstanding the degree of attention which this bird had received from naturalists, there was yet much to be learnt respecting its anomalous history. See L'Institut, 1834, p. 418. See also an article "on the Importance of preserving Facts connected with the Natural History of Animals,"—by Mr Swainson, in the Lond. Quart. Journ. of Science, (New Series) vol. i. p. 83.

[†] Hist. des Prog. des Sci. Nat. tome i. p. 5.

[‡] It has been well said by M. Laurillard, that "he who, in the introduction of his work on fossil bones, remarked,—*Why may not natural history one day have its Newton?* could not be the enemy of theory."—See some remarks by that writer, in his Eloge on Cuvier, in reply to those who have taunted Cuvier with being a mere collector of facts.—Edinb. New Phil. Journ. vol. xvi. p. 360.

II.—*On the Disunion of contiguous Layers in the Wood of Exogenous Trees.* By Rev. J. S. Henslow, M. A., Professor of Botany in the University of Cambridge.

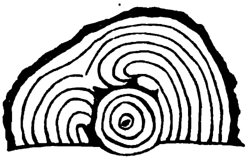
In his Introduction to Botany, (second edition, p. 267,) Dr Lindley concludes his account of the different theories which have been proposed to explain the manner in which the concentric layers of Exogenous trees are formed, by the following remark: "As this is one of the most curious points remaining to be settled among botanists, and as it is still as much open to discussion as ever, I have dwelt upon it at an unusual length, in the hope that some one may have leisure to prosecute the inquiry." It is very plain that Dr Lindley himself has embraced the theory of Du Petit Thouars, to which also several other botanists of distinguished reputation are equally inclined to assent.

This theory I need not dwell upon, as every botanist interested in physiological speculations is acquainted with it, and as it is fully explained in the work to which I have just referred. But as this theory cannot be considered so thoroughly established by any direct experimental proof, which has placed it beyond all cavil, I propose to examine one class of phenomena which have been considered easily explicable by this theory, but not so readily to be explained by any other which has been hitherto advanced. I allude to the appearances occasionally met with, where the old trunk of a tree is completely invested by the layers of wood composing an outer case or new trunk of the same. In the New Series of the Annales des Sciences, for 1835, (vol. iv. p. 126,) M. Meyen notices an observation of M. Wiegmann's to this effect: "L'observation d'un tronc de Saule mort au milieu d'un tronc vivant est très intéressante; ce phénomène a été observé par Lindley sur un Peuplier et s'explique bien par la théorie de Du Petit Thouars." This allusion to Dr Lindley refers to a paper of his in the Journal of the Royal Institution for May 1831, where he gives a description of a poplar apparently presenting the "singular anomaly of one tree growing within another."

My own attention was more particularly directed to this account about three or four years ago, upon meeting with a parallel instance; and since then I have been on the watch for other examples which might tend to throw further light upon the subject. The result of my inquiries has satisfied me that this phenomenon does not afford any direct evidence in support of the theory of Du Petit Thouars, but that it may be explained in a simple manner independently of that theory.

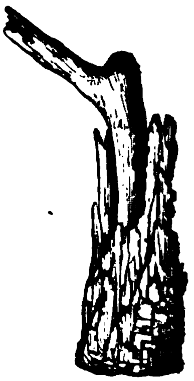
I possess a specimen strikingly similar to that described by Dr Lindley. It consists of about two feet of the trunk of a poplar six inches in diameter, which has been split longitudinally. In the centre is exposed the earlier state of this trunk, when it was about two inches in diameter, and the want of union between this central portion and the surrounding layers is complete. Upon the inner trunk (as we may call it) are the stumps of some pruned branches quite as distinct as in Dr Lindley's specimen. The wood of this inner trunk is sound except for some distance along its surface, on one side only. At the lower extremity of the specimen the layers of the outer trunk are regularly formed, being concentric with those of the inner, and possessing every appearance of having been deposited in the usual manner; and a transverse section would not have exhibited any want of organic union between the two trunks. But at the upper extremity, the layers of the outer trunk are not so regular. Those which lie next the inner trunk, instead of being continuous, are interrupted and curved inwards (FIG. A.) exactly as we see them in all cases where a wounded surface has become coated over with fresh wood. A patch of bark is enclosed between these layers and the inner trunk, and it is on this side that the surface of the latter is partially decayed. In short, the appearance is precisely that which would be presented if one side of the trunk had died whilst the other continued to grow, and spread gradually over the dead portion; and I cannot but conclude that such has really been the case, notwithstanding this want of organic connection between the inner and outer trunk. This want of union, therefore, does not arise from the death of the inner trunk previously to the deposition of the layers which are formed round it, as Dr Lindley supposes to have been the case in his specimen, but must have resulted from the action of some cause subsequent to the formation of the layer in immediate contact with the inner trunk, which layer may therefore have been deposited in the usual manner; without the necessity of our having recourse to the explanation afforded by the theory of Du Petit Thouars. In fact, according to Dr Lindley himself, this theory only explains the formation of the vascular portion of the layers, it being allowed that the cellular portion arises from a lateral development of this tissue in the

FIG. A.



older layers. It may readily be conceived that the excessive pruning, to which it is evident that Dr Lindley's poplar and my own specimen were subjected, might prevent the wood of that year's growth from becoming fully matured, and thus the connection between it and the next layer might be so slight as to admit of their being readily detached after the latter had become fully indurated. This separation would be further assisted by the numerous surfaces of the pruned stumps, since no union whatever takes place between the older wood thus exposed and the new wood which forms over it, the very marks of the knife, which may happen to be on it when imbedded, will be accurately preserved. But independently of the cause, whatever it may be, which has operated in producing the separation between the inner and outer layers of these specimens, it is by no means uncommon to find examples among the succulent branches of such wood as the willow, possessing a loose texture, where a slight degree of violence is sufficient to separate two contiguous layers, and I have found similar instances in large and dry branches of the elm. I possess a very good example from this latter tree, produced by the violence of the concussion with which a branch struck the ground when the tree was felled. The shock has detached some of the outer layers towards the extremity of the broken branch, and has thus left the inner layers exposed for some length, and exhibiting the perfect form which the branch possessed when it was much younger. (See FIG. B.)

FIG. B.



In the specimen of poplar which I have described, the inner trunk has not become so much contracted in drying as the surrounding layers, probably from its having been longer dead and more thoroughly seasoned; and the consequence is, that its extremities project beyond the truncated surfaces of the others. This fact points to another cause which may probably assist in disuniting two contiguous layers, since one portion of the trunk may die and either contract or expand more than the other.

The phenomenon we have been examining may be considered analogous to the growth of new wood round a decayed or hollow interior, or perhaps still more closely to the partial destruction of a newly formed layer by frost. A transverse section exhibits such a dead layer blackened and decayed, lying between two layers of sound wood.

In stating my opinion of the manner in which we may explain the phenomenon of a "tree within a tree," without the necessity of referring to the theory of Du Petit Thouars, I do not wish to be understood as asserting this theory to be incorrect. If it is to stand, it will doubtless be one day established upon clear and conclusive experimental proof; but in the meantime it is right for us to be cautious in admitting the explanation of any phenomenon upon the supposition of the theory being true, which may as easily be accounted for upon other and well established principles.

III.—*The Natural History of the British Entomostraca.* By WILLIAM BAIRD, Surgeon.

THERE is no order of insects to which so little attention has been paid by the naturalists of Great Britain, as the *Entomostraca,* and there are few, if any, that are more deserving of attentive study. The external appearance of these little interesting creatures, viz. *insects* enclosed in a *testaceous covering,* is enough of itself to excite the curiosity, and rouse the interest of the naturalist. A great number of them, indeed, are so like shells, that a person ignorant of the *inhabitants* would not fail at first sight to call them so;[*] and the very singular phenomenon of animals belonging to the class of insects, being so covered with a shell, has supplied to Müller the name of *Entomostracon,* a term derived from two Greek words, signifying "an insect with a shell;"[†] a name which this order of insects has hitherto maintained, and which has been almost universally adopted by naturalists from Müller's time to the present day. Previous to the appearance of Müller's work, the few species which were known, were arranged under one genus, the genus Monoculus—and they were so called from their possessing, or appearing to possess, only one eye. Schœffer appears to have proposed the name of *Branchiopodes* for them, from their feet possessing branchial appendages; and Müller says he would have preferred this name to that of Monoculus, were it not that several species wanted these organs. The species, however, which he mentions are either the Nauplii and Amymones, not aware that these were but the imperfect young of the genus Cyclops, or the Cythere, which possesses branchial appendages attached to the jaws instead of the feet. These facts, however, he was not aware of, and therefore he preferred to either of the above names, that of Entomostracon,—a name which I have said above has been retained by almost all succeeding authors, though most of them have applied the term Branchiopodes to some particular division of them. Linnæus only describes nine species in his *Systema Naturæ*. Seven others, however, had been figured by the microscopical observers, Joblot, Baker, Frisch, Geoffroi, and Ledermüller, while a few others had been added by the celebrated Ströem, Goeze, and Herbst.[*] Of all the earlier writers, however, the illustrious De Geer has perhaps given the most interesting memoir upon these insects.[†] He describes at length and figures most accurately seven species, and adds to the description some exceedingly interesting details. He seems to been aware of the transformations of the Cyclops, and has given pretty accurate figures of the young, though unfortunately he was not able to follow up his observations, and trace the final change into the perfect animal; which has since his time been so ably done by Ramdohr and Jurine, apparently without knowing of each other's discoveries. Leeuwenhoek also noticed the great difference between the young and old of these little animals, but did not follow up his observation either. Swammerdam and Schœffer have given a good many details with regard to some species of the Entomostraca; but though much interest may be derived from a perusal of the writings of these different authors, still it is to the celebrated Danish naturalist, Otho Fridericus Müller that we are most indebted. To him we owe the collecting the various species already made known, into one memoir—the arranging them into distinct genera and species,—many important and exceedingly interesting details with regard to them, never before made known, and the addition of an amazing number of new species, which that zealous naturalist discovered in the fresh waters, and on the sea coast of Denmark and Norway. He may be called the first regular historian of these insects. To him it is that we owe almost all our knowledge with regard to them; and to his eloquence is perhaps owing the further researches and more detailed histories of succeeding naturalists. His work on the Entomostraca, published in 1785,[‡] is one of the most interesting memoirs in natural history that we are acquainted with; and though it appears from later naturalists, that he has fallen into several errors, still it is the most complete and the best history of the Entomostraca that has ever been published. Since the time of Müller, much has been done by our Continental neighbours to add to our knowledge of these interesting little creatures. The works of M. Jurine, the father,* and Ramdohr,† have especially been successful in extending our acquaintance with the anatomy and economy of the Branchiopodes, but unfortunately their works are scarcely to be had in this country. The memoirs of M. Straus,‡ upon the genus Daphnia and Cypris, contain the most excellent and most minute histories of these two genera, that can be met with; and his researches, having been conducted with the greatest zeal and care, leave little to be done with regard to them by succeeding naturalists, but to add to the species. Jurine, (fils,)§ Daudebart de Ferussac, (fils,)|| Adolphe Brogniart,¶ Hermann, (fils,)** M. Prevost,†† and MM. Milne-Edwards and Audouin,‡‡ have each contributed excellent memoirs on detached genera and species, and greatly enlarged our knowledge of the history of a number of curious and most interesting animals.

---

[*] Müller.

[†] Entomostraca, p. 2.

---

[*] Müller.

[†] Mémoires pour servir à l'Hist. des Insectes, tome vii. Mem. 7. (French edition. Stockholm, 1778.)

[‡] Entomostraca, seu Insecta testacea quæ in aquis Daniæ et Norvegiæ reperit, descripsit et iconibus illustravit Otho Fridericus Muller. Lipsiæ et Havniæ, 1785, 4to.

Whilst the Continental naturalists have been thus earnest in studying the Entomostraca, it is curious that no British naturalist that we know of, with the exception of the celebrated Dr Leach, has paid any attention to them. The memoirs of this excellent naturalist, with the exception of two,§§ are for the most part scattered over various French periodicals, and are chiefly directed to the history of some of the parasitic animals belonging to the division. In his article Crustacea, in the Edinburgh Encyclopædia, he only enumerates sixteen species as found in Great Britain, a list which is increased by Samouelle in his "British Insects," to the number of twenty; and

---

* Histoire de Monocles qui se trouvent anx environs de Genéve. Genéve, 1820, 4to.

† Materiaux pour servir à l'Histoire de quelques Monocles de l'Allemagne.

‡ Memoires du Museum d'Histoire Naturelle, tome v. and vii.

§ Memoire sur l'Argule foliacé. Annales du Museum d'Histoire Naturelle, tome vii. p. 431.

|| Memoires sur deux Nouvelles espéces d'Entomostracés. Ann. du Mus. d'Hist. Nat. tome vii.

¶ Memoire sur un Nouveau genre de Crustacés (Limnadia.) Mem. du Mus. d'Hist. Nat. tome vi.

** Memoires Apterologiques, folio, Strasbourg, 1804.

†† Memoir on the Chirocephalus, in the Journal de Physique, tome liv., at the end of Jurine sur les Monocles, &c.

‡‡ Annales des Sciences Naturelles, tome ix. 1826. (Memoir on the Nicothoe.) Memoir on the Structure of Mouth in Siphonostomous Entomostraca, Ann. des Sciences Nat. tome xxviii. 1833.

§§ Supplement to Encyclopædia Britannica: Edin. Encyclopæd. Art. Crustacea.

we are not aware of the catalogue having been much increased since the publication of this latter work. It surely is not from want of interest belonging to them, that the naturalists of this country have so neglected these curious little animals, for many of them are worthy of all admiration. "The multifarious and complicated structure of their body," says Muller in his admirable work,* "the wonderful agility of their members; the very great fineness of their organs; their singular method of living and copulating; their living in waters which our cattle and we ourselves are daily drinking; the evils which they may give rise to, and which are seen to be inflicted on fishes; the emoluments, which, although we are in the greatest part ignorant of them, they nevertheless produce in the economy of nature;† that these things are very worthy of being known, scarce any one will doubt. Not to mention their external similitude to shells, and the natural transition which takes place in them, from insects to testaceous animals, who ever knew, before the Cypris was detected, of an insect quadruped? Before the Limulus and Caligus were properly observed, who ever knew of an insect acephalous, or with a head at least scarcely visible? Who ever imagined of a copulation of two males with one female at one time, such as takes place in the famous *Pulex aquaticus*? Or of an animal whose head was all eye, as we see in the Polyphemus? These and more wonders are to be met with in the history of the Entomostraca."

The systematic arrangement of the Entomostraca has been a matter of considerable discussion amongst naturalists; and has varied much according to the various views which authors have adopted. Desmarest, in his work on the Crustacea, published in 1825, has given a tabular view of the various arrangements which different authors have suggested, from Linnæus to his own time. In the last method adopted by Latreille in the fourth volume of Cuvier's *Règne Animal*, published in 1829, the following is the arrangement, and in it are, I believe, embodied almost all the genera introduced by his predecessors. Of the great class "Crustacea," he forms two general divisions, the "Malacostraca," and "Entomostraca." The Malacostraca he divides into five orders, "Decapoda, Stomapoda, Amphipoda, Læmodipoda, and Isopoda;" the Entomostraca, into two, the "Branchiopoda and Pæcilopoda." The order Branchiopoda contains those genera which have organs proper for mastication, are possessed of branchiæ attached to the feet or jaws, and are, for the most part, enclosed within a testaceous covering, either in the form of a buckler, or that of a bivalve shell. The second order Pœcilopoda embraces those insects which are not provided with organs proper for mastication, and are almost all parasitical, living upon fishes and other aquatic animals. The first order, the Branchopoda, is divided into two principal sections, the "Lophyropa and Phyllopa." The first of these again is subdivided into three very natural groups or families, the "Carcinoida, Ostracoda, and Cladocera;" while the second is subdivided into two. The Pœcilopoda, on the other hand, is composed of rather heterogeneous materials, and many of the genera approach very much to the "Lerneæ," though, according to Latreille, the presence of eyes, the faculty of changing their skin, or even of undergoing a species of metamorphosis, and the power which they possess of transporting themselves from one place to another, by means of feet, establish a positive line of demarcation between the Pœcilopoda and Lerneæ.* The arrangement abovementioned has, since 1829, received from its accomplished author, some modifications, which he published in 1831, in his "Cours d'Entomologie," but which I have not seen. The last writer upon the Crustacea, M. Milne-Edwards, in his work, half of which only is as yet published, † has taken perhaps a more philosophical view of the subject, and has proposed the following arrangement: The great class "Crustacea" he divides into three sub-classes, the characters of which are taken chiefly from the organization of the mouth. The two first of these have an apparatus *especially* provided for the laying hold of the substances destined for their food, while the third has no such special organization, their masticatory organs being the same as their organs of locomotion. The first sub-class is that of the *Maxillés* or those whose mouth is furnished with organs for *mastication*, the second is that of the *Suceurs*, or those whose mouth is furnished with an apparatus for *sucking*, and the third is that of the *Xyphosuriens*, or those whose organs of motion are the same as the organs of mastication, and which differ in many other points also from the two first. The subclass Maxillés, he again divides into four legions, *1st*, "Podopthalmiens," containing the orders "Decapodes" and "Stomapodes;" *2d*, "Edriopthalmes," containing the orders, "Amphipodes," "Isopodes," and "Lamipodes;" *3d*, "Entomostracés," containing the orders "Ostrapodes," and "Copépodes;" and *4th*, "Branchiopodes," containing the orders "Cladoceres" and "Phyllopodes." The order

---

* P. 4.

† "It is the common opinion, that it is the Caligi which force the salmon from the sea up rivers towards the waterfalls."

---

* Règne Animal, vol. iv. p. 147

† Histoire Naturelle des Crustacés, Suites à Buffon, tom. i. Paris, 1834.

Ostrapodes corresponds with Latreille's group Ostracoda; the Copépodes, with his Carcinoida, the Cladoceres, with his Cladocera, and the Phyllopodes corresponds with his second principal section, the Phyllopa. In this arrangement, therefore, the two last legions of the Maxillés, the Entomostracés and Branchiopodes, correspond exactly with Latreille's first order, the Branchiopoda; and form a very natural group; whilst the second order, the Pæcilopoda, is separated altogether from the Entomostraca, properly so called, and correspond with M. Milne-Edwards's sub-classes, Suceurs and Xyphosuriens. This arrangement I shall adopt in the remarks which follow, and my Catalogue of British "Entomostraca" shall thus be confined to Edwards's two legions Entomostracés and Brachiopodes, or Latreille's Branchiopoda.

The animals of this group, when noticed in their native habitats, may be seen to have their branchiæ constantly in motion, their action being seldom interrupted. One chief use, therefore, of these little insects, in the economy of nature, may be, as Muller says,* to ventilate the water day and night; and as they chiefly reside in standing pools, they may thus be of great use in preserving them from becoming soon putrid. As this may be considered one of the benefits conferred by these insects, it may be useful to know the evils to man they may be likely to produce. Though they are most abundant in stagnant water, they yet occur in considerable numbers in the purer sorts of water that serve as our common drink, and may frequently be seen in considerable quantity even in the drinking water of London, Edinburgh, &c.; and Müller asserts very gravely, that, as we thus drink them alive and with their eggs, he would not be surprised were we to discover them some day in the human intestines.† "The time," he says in another place,‡ "is at hand, when the causes of disease shall not only be sought after in the air, in our method of living, &c. but in the incautious use of waters, often abounding in innumerable animalcules." According to Müller and Straus, these insects live upon vegetable matter and not upon animals; and the former, in an experiment he instituted, says,§ that in keeping a number of species, such as the *Daphnia pennata* and *longispina, Cypris strigata* and *pilosa, Lynceus sphæricus* and *Cyclops quadricornis*, in the same water from the 24th July to the 22d January, during which time the water had evaporated from a depth of five inches to that of one, he frequently subjected small quantities of this water to the microscope, and was never able to discover any animalcules in it upon the most attentive examination, though the intestines of the Entomostraca themselves were seen to be full, sufficiently proving that they had not fasted during that time. This assertion, however, I am much inclined to doubt, at least with regard to some of the species, as I have seen dead specimens of *Cypris*, for example, attacked almost immediately upon their being placed in the water, by quantities of the *Cyclops quadricornis*, who, in a few minutes, had fastened themselves apparently upon the dead animal, and were so intent upon their prey that they were scarcely frightened away from it by being touched with the brush. In a short time the *Cypris* might be seen lying at the bottom of the vessel, the valves of the shell separated and emptied of their contents. Leeuwenhoek and De Geer not only maintain that the *Cyclops quadricornis* lives upon animalcules, but that they also prey upon their own young; a fact which I have also noticed myself. Jurine also asserts that the *Cyclops quadricornis* is carnivorous from taste, and only herbivorous from necessity, while the *Daphnia pennata* he distinctly says lives upon animalcules. When, indeed, we consider the amazing quantity of animals which swarm in our ponds and ditches, and the deterioration to the surrounding atmosphere which might ensue from the putrefaction of their dead bodies, we see a decided fitness in these Entomostraca being carnivorous, thus helping to prevent the noxious effects of putrid air which might otherwise ensue; whilst they in their turn become a prey to other insects which no doubt serve their purposes also in the economy of nature. The fresh water Gammari seem to prey upon them, and the Hydrachnæ are their decided enemies, for, says Muller, "they seize hold of them, when swimming, by their feet, and daintily suck the life's blood out of their captives with their sharp beaks."* "The Hydra also, and not a few aquatic larvæ, lay snares for them, and many Vorticellæ frequently grievously infest them, for they not only adhere, often in heaps, to the members projecting beyond the shell, but also nestling themselves within the shell, they overspread the whole body with their own colonies, not a little retarding the motion and agility of their host."† The transformation which the young of the genus *Cyclops* undergo in their progress to maturity, the changing their skin, not only of the body of the animal but also the whole shell, with various other very interesting details, I shall not insist upon here, but reserve them for a future number under the history of each genus.

---

* Entomostraca, p. 8. † Ibid. p. 33. ‡ Ibid. p. 12. § Ibid. p. 7.

(*To be continued.*)

---

* Entomostraca, p. 8.

† Ibid.

IV.—*Notices of British Fungi.* By Rev. M. J. Berkeley, M. A.

No. I.

Though the number of British Fungi described in the last volume of the English Flora amounts to nearly 1400, it is remarked in that work, that this is by no means to be considered as more than an approximation to a perfect list of the species indigenous to Great Britain. Indeed many of considerable interest occurred while the sheets were passing through the press, which were inserted in the body of the work, with the exception of a few which are noticed in the list of addenda, and several have lately fallen in my way, which at present are unrecorded, as belonging to the British Flora. It is proposed, therefore, from time to time, after the plan of the admirable communications of a similar description by M. Montagne, in the Archives de Botanique, and the new series of the Annales des Sciences Naturelles, to give detailed descriptions and figures of such as are new or of any peculiar interest, but, as regards those which are well known, mere references to some good authority, with occasional remarks, and indication of the places where they occurred. New localities of the rarer species will also be inserted, and any additional information respecting such as are already recorded. These by way of distinction will be marked with an asterisk.

1. *Agaricus mastoideus*, Fr. Syst. Myc. vol. i. p. 20. Mastocephalus, Batt. Fung. Hist. p. 30. tab. 10. fig. A.—This very interesting and beautiful Agaric occurred sparingly amongst moss, under blackthorn in a wood at King's Cliffe, Northamptonshire, towards the end of October 1835. There can be little doubt that it is identical with the species which Battarra had in view, and which Fries has adopted from his figure and description. Like Ag. excoriatus it is very nearly allied to Ag. procerus, but is distinct from both in its slender habit and papillose scales.

Pileus 1¾ inch across, ¾ inch high, very strongly umbonate, with a depression round the umbo, subcarnose; epidermis breaking up into small umber papillæ, which are larger and more scattered towards the margin. Gills remote, rather narrow, yellowish. Stem 3½ inches high, slender, strongly attenuated upwards, incrassated at the base, sunk into the substance of the pileus, minutely villoso-squamose, filled within with cottony fibres. Ring deflexed, scarcely moveable. My specimens were rather past maturity, I cannot, therefore, assert positively that the stem in the young plant is so tough as described by Battarra.

Tab. II. fig. 1. *a.* Agaricus mastoideus. nat. size; *b.* vertical section.

* 2. *Ag. pelianthinus*, Fr. Syst. Myc. vol. i. p. 112.—This species,

which appears to have been noticed only by Bolton, occurred abundantly at King's Cliffe, October 1835. The gills are sprinkled over with short purple hairs, like those on the lip of Orchis fusca, which on the edge are arranged in fascicles. Smell strong, somewhat like that of Ag. sulphureus. Sporidia white. Habit approaching to that of some species of the subgenus Psathyra.

3. *Ag. rubidus*, n. s.—Amongst mosses on the mould of a pot containing a foreign Polypodium, consisting of peat and sand, in a hothouse at Milton, Northamptonshire, March 1, 1836.

Pileus ⅛ inch broad, convex at length umbilicate, the margin sometimes slightly wavy membranaceous, finely silky white or grayish, acquiring at length a pale ruddy tinge. Gills broad, ventricose, adnate, with frequently a more or less distinct tooth, in consequence of which they are sometimes at length decurrent, rose-coloured, as far as I could observe not clothed with any spiculæ. Sporidia rose-coloured, elliptic. Stem 1½–2 lines high, thickest above, white or grayish like the pileus, quite solid, minutely silky. Smell like that of new flour.

This species belongs clearly to the subgenus Eccilia of the second series Hyporhodius, and is quite distinct from all described by Fries.

Tab. II. fig. 2. *a.* Ag. rubidus, nat. size; *b.* vertical section of three states, do; *c.* Sporidia highly magnified.

*4. *Ag. glaucopus*, Schæff. Fr. Syst. Myc. vol. i. p. 224.—The plate of Sowerby referred to by Persoon and Fries for this species, belongs rather to Ag. callochrous, *a*, and in consequence the description given in the English Flora, which was made with an especial view to it. The true plant, which occurred at King's Cliffe, at the end of October 1835, is one of the finest of our Agarics.

*5. *Ag. speciosus*, Fr. Obs. 2. p. 1.—Since the account of this species was given in the Addenda to the English Flora, I have seen Letellier's Supplement to Bulliard, which contains at t. 623. *a*, (under Ag. volvaceus,) and t. 645, figures of Ag. gloiocephalus, D. C. His figure accords precisely with the plant I have in view, except that there is no indication in it of villosity on the stem and volva, but, as it appears to me, there are no characters to distinguish it from Ag. speciosus. The volva is by no means obliterated, the stem not equal, but always móre or less attenuated upwards, and sometimes even bulbous, and one of the specimens is almost four inches broad. The peculiar manner in which the volva passes under the stem is also the same.

6. *Polyporus cinctus*, n. s.—On a very rotten plank from an old house, King's Cliffe.

The first growth of this highly curious species consists of small erect scattered tufts of radiating strigose fibres, somewhat resembling those which clothe the pileus of Pol. vulpinus and its allies, but finer. Many of these remain barren, and would be considered as an Ozonium; but under favourable circumstances a distinct hymenium 1½ line thick, with a free even abrupt vertical circumference is formed in the centre of each tuft. Numbers of these at length become confluent, the strigæ towards the centre of the mass are obliterated, while those towards the circumference form an erect fringe to the patch, the edges of the hymenium coming occasionally adnate with the strigæ. If the whole be now removed from the wood, the base of each original fasciculus is often visible. Pores so minute as to be quite invisible to the naked eye, angular, sometimes a little sinuous with a rather ragged edge; dissepiments extremely thin. The colour of the whole is pale ochraceous, with more or less of a tawny tinge when dry. The specimens with which I met had been exposed to the weather for some time, and probably, when quite fresh, were nearly white. The species appears to me quite distinct, and its mode of growth very peculiar.

Tab. II. fig. 3. *a.* Various states of Polyporus cinctus, nat. size; *b.* a portion of the hymenium from the centre of one of the fascicles; *c,* a vertical section of a portion of the hymenium at the circumference of a patch; *d.* orifices of pores; *b. c. d.* more or less magnified.

7. *Thelephora puteana,* Schum. Fr. Syst. Myc. vol. i. p. 448.—On deal in a closet with a brick floor in a dairy, with a northern aspect, King's Cliffe.

I cannot refer my plant accurately to any of the varieties described by Fries in his Elenchus, the specimens themselves varying from almost perfect evenness to considerable inequality of surface, with various tints of olive, tawny, ferruginous, cinereous, &c. in the same patch. Those which grew on the under side of the shelf were the most rugged, and the patches less continuous, while others which spread from the perpendicular painted front horizontally over the brick floor, were almost even with a broad soft ochraceous margin. When placed after being gummed on paper, and preserved in the herbarium for several weeks in the original locality, where the fungus had been entirely destroyed by a solution of corrosive sublimate, and the wood work in consequence in an unusually damp season having become quite dry, which before was constantly dripping, the whole in twelve hours recovered its original fleshy appearance, and was studded with drops of coffee-coloured moisture. It should be observed that my plant when rubbed has a disagreable fishy odour.

How far it may agree with Th. fœtida, Ehr., formerly presumed by Fries a state of Th. puteana, but now rather considered as a form of Th. stabularis, I am unable to say.

8. *Th. arida*, Fr. El. i. p. 197.—In the inside of decayed hawthorn, Rockingham Forest. This species when placed in the same closet as the foregoing remained perfectly dry.

* 9. *Pyronema marianum*, Carus and Nees v. Esen. Nov. Act. Leop., &c. vol. xvii. pt. 1. p. 369, tab. 27. Thelephora carbonaria, Bertero in Hook. Herb. Eng. Fl. vol. v. p. 2, p. 169.—In the same month and year in which this curious plant, first discovered by Bertero at Juan Fernandez, occurred in England, it was met with in great abundance, by the celebrated anatomist Dr Carus at Marienbad, by whom, with the concurrence of Nees Von Esenbeck, a new genus was proposed in the last part of the above cited transactions. As this appears to be an excellent one, though very difficult of definition, I take the present opportunity of adopting it, with a slight alteration of one phrase, in the character given by Nees Von Esenbeck in an appendix to Dr Carus's paper, which appears to me calculated to mislead, and to be contrary even to Nees Von Esenbeck's own views, who appears to have worded it as it stands in deference to the description given by the learned discoverer of the plant in Germany, rather than to his own better judgment. Dr Carus, however, appears to have paid but little attention to fungi, and therefore, though any thing coming from such an observer deserves ample consideration, there is less scruple in not following him exactly. The asci which are highly developed, as in the superior Pezizæ, are accompanied by paraphyses which, under a high magnifier, were found to contain globose orange-coloured granules. The true elliptic sporidia are copiously given out from the plant when laid upon a piece of glass; the contents of the more slender filaments either lose their colour completely, or are also given out, which, however, has not been observed. I suspect the former to be the real state of the case, the granules becoming invisible from transparency. That the paraphyses should contain granules is probably by no means unusual. Such would, I believe, be found the case with high magnifiers in Peziza humosa, granulata, &c. where a great part of the colour of the hymenium arises from the coloured paraphyses. The matter, however, deserves investigation, as the presumed (but not observed) evacuation of the more slender cells in the plant before us, if confirmed, would be highly curious. Till this point, however, be clearly proved, it appears to me much better to consider them as the same organs with the paraphyses in Peziza. The generic character will then stand thus:

Pyronema, Car.—Resupinate, effused; hymenium furnished with highly developed asci containing large elliptic sporidia, accompanied by paraphyses. Circumference byssoid.

That given by Nees Von Esenbeck stands thus:

Resupinate, effused. Asci of the hymenium of two kinds, each bearing sporidia; the more slender with globose coloured sporidia, the wider with larger oval hyaline erumpent sporidia. Circumference byssoid.

Besides Pyronema marianum, Thelephora sulphurea is also referred to this genus, which will come next to Thelephora.

The propriety of such reference is perhaps at present uncertain. I do not restore the original specific name of Bertero, though infinitely preferable to that given by Dr Carus, which refers to the circumstance of the plant being pointed out to him by his daughter, as it would be only adding to the number of synonyms with which mycology is already overburdened.

* 10. *Peziza rosæ*, Pers. Fr. Syst. Myc. vol. ii. p. 109.—Introduced as British on the authority of unnamed specimens in Captain Carmichael's collection. It occurred in October 1835, at Lambley Notts, and Fineshade, Northamptonshire.

11. *Pez. sanguinea*, Pers. Fr. Syst. Myc. vol. ii. p. 110.—On firwood, Beeston Notts, Nov. 1835.

12. *Pez. fusarioides*, n. s. Berk. Brit. Fung. Fasc. 2, ined.—On stems of nettles with or without Fusarium tremelloides. Apethorpe, Northamptonshire, March, April, 1836.

At first sight, this beautiful species so strongly resembles in habit Fusarium tremelloides, that it is very difficult to believe that it can be anything more than a more perfect form of the same plant, and in consequence it has probably been overlooked. Cups, scarce a line in diameter, shallow, scattered or gregarious, originating beneath the cuticle, scattered or collected in patches, at first subglobose, but slightly attached below, gradually expanding and more adnate with a rather thick, even; or flexuous border, orbicular or elongated, sometimes confluent bright orange. Asci clavate, slightly flexuous, accompanied by slender linear paraphyses, which are sometimes longer than the asci. Substance firm, not tremelloid, as in the Fusarium, which it so much resembles. Its nearest ally appears to be Peziza axillaris, Nees.

Tab. II. Fig. 4. *a.* Peziza fusarioides, nat. size; *b.* do. magnified; *c.* a young plant seen from beneath, do.; *d.* asci and paraphyses, highly magnified.

* 13. *Tremella foliacea*, Pers. Syn. p. 626.—On stumps of birch,

Wittering, Northamptonshire.—The state hitherto described as British is the purple-violet variety. Sporidia subelliptic.

14. *Sclerotium medullare*, n. s. Berk. Brit. Fung. Fasc. 2. ined.—At King's Cliffe, in the inside of stems of Pteris aquilina, which had been rotting from the previous summer, in a heap by the borders of a wood in an exposed situation. I found it only in one spot, but after a diligent search obtained a tolerable supply of specimens. At first entirely inclosed in the soft contents of the stem, subglobose, or more generally oblong, brown, then black, even, black within, with a slight shade of olive: as it swells the stem is generally split, and occasionally it protrudes and assumes a more or less sinuous form. When dry it is irregularly and coarsely corrugated, whitish within; the dark colour of the flesh is, however, restored after it has been for some time immersed in water. Outer skin, when viewed by transmitted light with a high magnifier, composed, as in Sclerotium durum, of roundish irregular cells.

Tab. III. Fig. 5. *a.* Sclerotium medullare, nat. size; *b.* do. magnified; *c.* do. do. when dry; *d.* a slice of the fresh plant; *e.* a thin slice of the outer coat; *f.* a slice of the dried plant; *d. e. f.* all highly magnified.

* 15. *Polyangium vitellinum*, Lk. Fr. Syst. Myc. vol. ii. p. 305.—On loose stumps in a wood at King's Cliffe. My specimens exactly agree with the figure of Ditmar. Occasionally the sporangia vary a little from the usual oblong ovate form, in consequence of mutual pressure towards the centre of the uterus.

* 16. *Sphæria rubiginosa*, Pers. Fr. Scler. Suec. n. 142.—This species, introduced on the authority of a single specimen from Captain Carmichael, is not uncommon, on fallen decorticated branches of service and crab in Rockingham Forest.

* 17. *S. favacea*, Fr. Scler. Suec. n. 306.—On birch, Wittering, Northamptonshire.

18. *S. detrusa*, Fr. Scler. Suec. n. 6.—On barberry, Wansford, Northamptonshire.

19. *S. velata*, Fr. Scler. Suec. n. 225.—On lime, King's Cliffe.

20. *S. microstoma*, Pers. Fr. Scler. Suec n. 185.—On blackthorn, Apethorpe, Northamptonshire.

* 21. *S. hypodermia*, Fr. Scler. Suec. n. 32.—On elm, common.

22. *S. xanthostroma*, Mont. Fr. Scler. Suec. n. 444.—On a stick used as a marker in a garden at King's Cliffe, but not completely developed.

23. *S. pantherina*, Berk. Brit. Fung. Fasc. 1.—On Pteris aquilina, King's Cliffe, &c.

24. *S. decedens*, Fr. Scler. Suec. n. 81.—On hazel, common.

25. *S. sanguinea*, var. *cicatricum*, Berk. Brit. Fung. Fasc. 2, ined.—A marked variety with very much of the habit S. coccinea, but without any stroma; growing in patches upon the scars left by the fallen leaves of dead twigs of Buxus sempervirens, and occasionally in the axil before their leaf has fallen. It has occurred once only at Apethorpe. Perithecia much more minute than in other states of S. sanguinea, so as, except from their bright colour, to be scarce distinguishable to the naked eye, crowded, scarlet, subglobose, with a distinct very obtuse short papilla, collapsed laterally when dry. Asci linear, large for the size of the plant. There were no sporidia in my specimens gathered towards the end of winter.

Tab. III. Fig. 6. *a.* Plant nat. size; *b.* do. magnified; *c.* asci highly magnified.

26. *S. herpotricha*, Fr. Scler. Suec. n. 52.—King's Cliffe. On reeds and grasses.

27. *S. arundinis*, Fr. Syst. Myc. vol. ii. p. 510.—On reeds with the foregoing. Sporidia exactly resembling those of some species in the division Platystomæ.

28. *S. angelicæ*, n. s. Berk. Brit. Fung. Fasc. 2 ined.—On dead mostly decorticated stems of Angelica sylvestris, King's Cliffe, March 1836.

So minute as to be quite invisible to the naked eye, except the stem on which it grows is wet, when extremely minute black dots, the protruded tips of the ostiola, are perceived arranged in single rows upon the ribs, but not connected in any way, so that the species is better arranged amongst the Caulicolæ than Seriatæ. Perithecia black, or brownish when viewed by transmitted light, immersed in the woody part of the stem, their bases resting upon the commencement of the pith, globose, furnished with a somewhat abrupt conical subobtuse neck, which protrudes just beyond the surface of the stem, and is pierced with a minute round orifice. Contents of the perithecia pink, oozing out, and forming a little halo round the ostiolum. Asci minute, linear, containing a few subelliptic sporidia, accompanied by variously sized globules of an oily matter. The perithecia are sometimes slightly rugged, and the neck wrinkled transversely by the pressure of the woody fibres. The only species which, as far as I am aware, can at all be compared with the present is S. duplex, Sow. figured on the stem of some umbelliferous plant. Of this, as stated in the English Flora, there is no specimen preserved in his Herbarium, but if the figure and description are to be regarded, the present plant, which has not the ostiolum in the slightest degree dilated, cannot be identical with it. At all events, it is not the same species with S. duplex, Fr. on Sparganium, &c. and is remarkable for its coloured jelly, and, if the character be constant, for the oily globules contained in it.

Tab. III. Fig. 7. *a.* Sphæria angelicæ, nat. size; *b.* two perithecia in situ magnified; *c.* contents of the perithecia highly magnified.

29. *Physarum metallicum,* n. s. On a decorticated stick at Clifton Notts, November 1835.

Peridium subglobose, slightly depressed, a line or more in breadth, sessile, (not adnate) quite smooth, very delicate, of a most beautiful metallic appearance, bursting irregularly. Sporidia and flocci pink-grey. This most beautiful plant connects Lycogala with Physarum, in consequence of its bright coloured sporidia. The peridium is, however, perfectly simple.

Tab. III. Fig. 8. *a.* Physarum metallicum, nat. size; *b.* do. magnified; *c.* flocci and sporidia highly magnified.

30. *Isaria brachiata, Schum.* Fr. Syst. Myc. vol. iii. p. 279.—On stems of hollyhock, Apethorpe, March 1836.

31. *Isaria citrina,* Pers. Fr. l. c. On the ground amongst leaves, King's Cliffe, exactly answering in every point to the plate of Ditmar.

32. *Stilbum rigidum,* Pers. Fr. Syst. Myc. vol. iii. p. 302.—On rotten wood, King's Cliffe.

33. *Stilbum piliforme,* Pers. Fr. Syst. Myc. vol. iii. p. 303.—With the former.

34. *Stilbum anomalum,* n. s. On the dead leafless shoot of some hypnum on a loose stump, King's Cliffe.

About half a line high, stem black, yellow above, generally smooth but sometimes furnished with a few short flocci towards the base, head subglobose, yellow, when placed in water falling away into subfusiform sporidia, which rest upon a flat disc-like expansion of the upper part of the stem. Exceedingly like Stilbum xanthocephalum, but agreeing with S. atractium in its subfusiform sporidia. Its consistence is not, however, at all gelatinous. Is the character of fusiform sporidia of sufficient importance to separate this species from S. xanthocephalum? I have a plant with fusiform sporidia resembling in every other respect Stilbum rigidum.

Tab. III. Fig. 9. *a.* Plant, nat. size; *b.* do magnified; *c.* do. placed in water highly magnified.

35. *Psilonia arundinis,* Desm. Fr. Syst. Myc. vol. iii. p. 451.—With Sphæria arundinis and S. herpotricha.

36. *Stilbospora angustata,* Pers. Fr. Syst. Myc. vol. iii. p. 485.—On Cornus sanguinea. Milton, Northamptonshire.

37. *Melanconium bicolor,* Nees, Fr. Syst. Myc. vol. iii. p. 488.—On birch, King's Cliffe.

V.—*Contributions to the Ichthyology of the Firth of Forth.* By R. Parnell, M. D.

I.—*The White-bait.—The Sprat.—The Herring.*

Gen. Char. Tongue and roof of the mouth with minute teeth; under jaw the longest.

Clupea alba, Yarrell. (The White-bait.) Tab. I. Fig. 1. Dorsal fin placed nearer the tip of the tail than to the point of the nose; ventral fins under the dorsal.

Clupea alosa, Donovan, Pl. 98.—White-bait, Pennant.—*Clupea alba*, Yarrell, Zool. Journal, and Brit. Fishes, ii. p. 126.

The White-bait, which is found so plentifully in the Thames, and is so well known in the neighbourhood of London, as a delicate and well-flavoured fish, was supposed by naturalists to be the young of the shad, until Mr Yarrell, in the Magazine of Natural History, proved it to be a distinct species.

In many respects it differs materially from all the other British species of Clupea, not only in specific characters, but also in its habits, and is one as distinctly marked as any of its congeners. From the beginning of April to the end of September, this fish, according to Mr Yarrell, may be caught in the Thames as high up as Woolwich or Blackwall, every flood tide, in considerable quantity; while during the first three months of this period, neither species of the genus Clupea of any age or size, except occasionally a young sprat, can be found.

About the end of March, or early in April, white-bait begin to make their appearance in the Thames, and remain till the end of September, when they are no longer to be found in the river. In the months of June, July, and August, provided the weather be fine, immense quantities are consumed by visitors to Greenwich and Blackwall, where epicures of all orders assemble for a white-bait feast.

The fishery for these fish is continued in the Thames frequently so late as September, and specimens of young fish of the year, from four to five inches long, are then not uncommon, but mixed, even at this late period of the season, with others of very small size, as if the roe had continued to be deposited throughout the summer.

The white-bait is not, as it was formerly considered to be, peculiar to the Thames, as I have found it to inhabit the Firth of Forth in considerable numbers during the summer months. From the beginning of July to the end of September they are found in great abundance in the neighbourhood of Queensferry, and opposite Hopetoun House, where I captured, on one dip of a small net, of about a foot and a half square, between two and three hundred fish, the greater part of which were white-bait of small size, not more than two inches in length; the remainder were sprats, young herring, and fry of other fish.

In their habits they appear to be similar to the young of the herring, always keeping in shoals, and occasionally swimming near the surface of the water, when they often fall a prey to aquatic birds.

I have no doubt that the white-bait will be found to exist in the Firth of Forth throughout the whole of the year in considerable quantity, and that the fishermen would find it a new source of income, equal or superior to the spirling fishery, did they use the mode of fishing for white-bait that is practised in the Thames. But in consequence of the large extent of the estuary, and of no means being used exclusively for the capture of these fish, we can form but a faint idea of the number that may there exist.

The white-bait net which is used in the Thames is not large; the mouth of it measures only about three feet across, but the mesh of the hose, or bag-end of the net, is very small. A boat is moored in the tide-way, where the water is from twenty to thirty feet deep; and the net with its wooden frame is fixed to the side of the boat. The tail of the hose, swimming loose, is from time to time brought into the boat, the end untied, and its contents shaken out. The wooden frame forming the mouth of the net does not dip more than four feet below the surface of the water.

The largest specimen of Clupea alba that I have met with, taken from the Firth of Forth, measures five inches in length. The upper part of the back, from the nape to the tail, is of a pale greenish ash-colour, the sides, gill-covers, pectoral, ventral, and anal fins, of a beautiful pure white; the dorsal and caudal fins straw colour, minutely spotted with dark brown. The head on the summit in young specimens is marked with a large brown spot, which is divided anteriorly by a white line. Each orbit on the superior margin is tinged with black, as well as the posterior inferior margin, but in a less degree. The shape of the body resembles that of the young herring, but it is more compressed and of a deeper form. The first ray of the dorsal fin commences exactly midway between the point of the upper jaw and the end of the middle caudal ray; the ventral fins are placed behind the third ray of the dorsal; the tail is deeply forked, the middle ray being not quite half the length of the longest ray of the same fin. The fin rays in number are,

D. 17; P. 15; V. 9; A 15; C. 20; Vert. 56; Cœcal append. about 15.

The head, in a specimen five inches long, is not quite one-fourth the length of the whole fish. In a fish four inches long, the head is exactly one-fourth the entire length. In one two inches long, the head measures more than one-fourth the whole length. Each jaw on the anterior part is furnished with a few small slender teeth, about six in number, placed in one row, which are more perceptible on the lower than on the upper jaw; on the roof of the mouth as well as on the tongue, are placed three or more rows of teeth, which can be easily felt by the assistance of the point of a fine needle. In this respect my observations differ from those of Mr Yarrell, who says, the tongue of the white-bait has an elevated central ridge without teeth; but it is probable that that author did not examine a dried specimen, for until in that state, it is almost impossible to perceive the teeth, in consequence of their extreme minuteness. This is a most important character, and at once removes it from the shad, which has the tongue and roof of the mouth destitute of teeth.

The white-bait, four inches long, differs from the herring, sprat, and pilchard of the same length, in the following characters:

The herring has the dorsal fin half-way between the point of the upper jaw and end of the long caudal rays; with the head nearly one-fifth the entire length. The white-bait has the dorsal fin much nearer the tip of the tail, than to the point of the upper jaw, with the head one-fourth the length of the whole fish; the body is more compressed, of a much lighter colour, and the belly much rougher under the pectorals, than is observed in the herring.

The sprat has the origin of the ventral fins situated anterior to a vertical line dropped from the first dorsal ray, with 48 vertebræ; the white-bait has 56 vertebræ, with the origin of the ventral fins placed behind the third ray of the dorsal. In the pilchard the dorsal fin is placed exactly in the centre of gravity, so that when the fish is held up by the anterior rays, the body preserves an equilibrium, whereas if the white-bait, herring, or sprat, be taken up by the same part, the head will be observed to dip considerably.

The stomach of the white-bait I have found frequently filled with minute crustacea.

Clupea sprattus.—(Sprat or Garvie Herring.) Tab. I. Fig. 2. Dorsal fin nearer the tip of the tail than to the point of the upper jaw; ventral fins before the dorsal.

This little fish, although well known to every one by the name of Sprat or Garvie Herring, is not admitted by all to be a distinct species, being considered as the young of the pilchard or the herring. This mistake is not to be wondered at, since authors either omit the most important characters, or place reliance on characters which do not exist.

Sprats are found in the Firth of Forth throughout the whole of the year, and, like many small animals, appear to be very susceptible of cold. During the warm summer months, they are seen sporting about in large shoals, in every part of the Firth, occupying a considerable extent of water, and causing a ripple on the surface with their fins, while they become the principal food of many marine birds, which assail them in the water, or prey on them from above. As the cold weather advances, these little fish are no longer seen in the lower part of the estuary, but are found to ascend the Firth to a considerable distance, and to select that part of the river where the fresh and salt waters mingle together; for it is a well known law in chemistry, that when two fluids of different densities come in contact, the temperature of the mixture is elevated for a time in proportion to the difference in density of the two fluids. Owing to mutual penetration and condensation, such a mixture is constantly taking place in the rivers that run into the sea, and the temperature of the mixed water is accordingly elevated. In the year 1830, the sprat was remarkably abundant all over the British coast, but more particularly on the coasts of Kent and Essex, where they were taken in immense quantity, so that they were sold at sixpence a bushel as manure for the land.

The sprat is generally considered as a delicious well-flavoured and wholesome fish, and is eaten in considerable quantity in this country, both in the fresh and salted conditions, but is very seldom brought to the Edinburgh market. They spawn early in the month of March, and feed on small crustaceous animals.

The most common size of a sprat is from four to five inches in length, but it is observed occasionally to exceed six inches and a half, when it is named in the neighbourhood of Alloa the King of Garvies.

The colour of the back is a deep glossy blue, the sides, belly, and gill-covers of a pure silvery white, passing into green and blue reflections, when viewed in different lights; the dorsal and caudal fins dusky, minutely spotted with black; the pectoral and ventral fins white, slightly tinged with orange. On the crown of the head is a dark spot placed between the eyes, which is very perceptibly seen when young, but as the fish increases in size the spot gradually becomes obliterated. The eye is large, the diameter being not less than one-fourth of the whole head; the upper and lower margins are tinged with black. Each operculum has a slight notch placed on its upper and posterior edge. The teeth in the jaws are small, slender, and few in number; they are situated on the most anterior parts, and are more obvious on the lower than on the upper jaw; the tongue as well as the roof of the mouth is also armed with fine teeth, their points being slightly bent inwards. The under jaw is the longest. The belly is strongly serrated as far as the anal aperture. The convexity of the dorsal and abdominal lines is much greater than is observed either in the white-bait or the herring. The fin rays in number are.

D. 17; C. 19; P. 15; V. 7; A. 18; Vert. 48; Cœcal append. about 12.

The dorsal fin commences exactly half way between the point of the lower jaw and the end of the middle caudal rays. *

The ventral fins arise anterior to a vertical line dropped from the origin of the first dorsal ray, and have distinct axillary scales, nearly half as long as the fin, which are always present in a recent and perfect sprat. †

The scales are large, about the size of the orbit, round, and very deciduous. They are placed in seven rows between the dorsal and ventral fins.

The sprat differs from the herring, white-bait, pilchard, and shad in two most striking characters; in having only 48 vertebræ, and in having the origin of the ventral fins placed before a vertical line dropped from the commencement of the first dorsal ray.

Clupea harengus.—(The Herring.) Tab. I. Fig. 3. Dorsal fin half way between the point of the upper jaw and end of the long caudal rays.

Herrings enter the Firth of Forth about the end of December, or the beginning of January, and remain two or three weeks at the mouth of the estuary before they attempt to ascend. This delay seems greatly to depend on the state of the weather, for in some seasons when it is mild and fine, the herring has been observed to swarm in the Firth off Musselburgh in the early part of January; whilst in the rough and stormy seasons they do not make their appearance in that part of the river before the middle of February, and always disappear before the end of March. They seem to visit the Firth regularly every winter, and a season very seldom passes without a few being captured and sent to the Edinburgh market. Some years they appear in much larger shoals than in others, the reason of which is not accounted for. In the year 1816, pilchards were taken in the Firth of Forth in great abundance, when not a dozen herrings were seen during the whole winter. Since that time not a single pilchard has been known to enter the estuary.

---

* In Yarrell's British Ichthyology, vol. ii. p. 124, the dorsal fin is said to commence exactly half way between the point of the lower jaw and end of the caudal rays.

† In Yarrell's British Ichthyology, vol. ii. p. 124, it is there stated that the ventral fins arise in a vertical line under the first dorsal ray, and have no axillary scales.

"The herring is in truth a most capricious fish," says Dr Macculloch, "seldom remaining long in one place; and there is scarcely a fishing station round the British islands that has not experienced in the visits of this fish the greatest variations both as to time and quantity, without any accountable reason. In Long Island, one of the Hebrides, it was asserted that the fish had been driven away by the manufactory of kelp; some imaginary coincidence having been found between their disappearance and the establishment of that business. But the kelp fires did not drive them away from other shores, which they frequent and abandon indifferently without regard to this work. It has been a still more favourite and popular fancy, that they were driven away by firing of guns; and hence this is not allowed during the fishing season. A gun has scarcely been fired in the Western Islands, or on the west coast, since the days of Cromwell: yet they have changed their places many times in that interval. In a similar manner, and with equal truth, it was said that they had been driven from the Baltic by the battle of Copenhagen. It is amusing to see how old theories are revived. This is a very ancient Highland hypothesis, with the necessary modifications. Before the days of guns and gunpowder, the Highlanders held that they quitted coasts where blood had been shed: and thus ancient philosophy is renovated. Steam-boats are now supposed to be the culprits, since a reason must be found. To prove their effect, Loch Fyne, visited by a steam-boat daily, is now their favourite haunt, and they have deserted other lochs where steam-boats have never yet smoked. A member of the House of Commons, in a debate on a tithe bill lately stated, that a clergyman having obtained a living on the coast of Ireland, signified his intention of taking the tithe of fish, which was, however, considered to be so utterly repugnant to the privileges and feelings of the finny race, that not a single herring has ever since visited that part of the shore."

In June, July, and August, herrings are taken off the Dunbar and Berwick coasts in considerable number, from whence the Edinburgh market is abundantly supplied, when scarcely a single herring is to be seen higher in the Firth of a size worth the notice of the fishermen.

Herrings are said to deposit their spawn towards the end of October, and it is nearly three months previous to this operation that they are found to appear on our shores, when they become of so great a national importance.

The spawning of these fish in October only, does not appear to me to account for the number of small fry, two inches in length, that are found in the Firth of Forth during the month of July; and the young herrings that are taken from six to seven inches long in the month of February, mixed with fry from two to three inches in length. When herrings are brought to the market in the first two months of the year, I have always found them full of spawn, and in the middle of March I have observed many very lank, with not a single ovum to be seen. Hence it is not improbable, that the same species of herring might spawn twice in the year, early in the month of March and also towards the end of October.

Pennant supposes that the herring migrates to a considerable distance; that they begin to appear first off the Shetland Islands in April and May, and divide into distinct columns from four to six miles in length and three to four in breadth; and that after they have taken their circuit, they return again to the Arctic circle, where they recruit themselves after the fatigue of spawning. But it is more consistent to suppose, that the herrings approach our shores for the purpose of depositing their spawn like other fishes, and when this is accomplished, return again to the deep sea.

The most common length of a full-grown herring is eleven inches, and two and a quarter deep. The upper part of the back is of a deep glossy blue; the sides and belly silvery white. Each jaw on the anterior part is furnished with six or eight teeth placed in one row, which are more perceptible on the lower than on the upper jaw; the vomer is supplied with a double row, about sixteen in number; on each side is another row of teeth, which are rather smaller; the tongue is also armed with teeth, arranged in three or four rows, with their points directed inwards; the under jaw is longest, and is tipped with black; eyes large and silvery, placed nearer to the point of the nose than to the posterior margin of the operculum. The first ray of the dorsal fin in an adult fish arises exactly half way between the point of the upper jaw and the base of the middle caudal rays; the origin of the ventral fins is placed behind the third dorsal ray, half way between the point of the lower jaw, and a little beyond the end of the middle caudal rays.

The fin rays in number are:

D. 17; C. 20; P. 16; V. 9; A. 15; Vert. 56; Cœcal append. 21.

The tail is deeply forked, the middle rays less than half the length of the longest ray of the same fin; the second ray of the dorsal fin, a little longer than the base of that fin; the scales are large, oval, and very deciduous, placed in fifteen rows between the dorsal and ventral fins. Most authors suppose that the belly of the herring is not serrated in any stage of its growth, which is said to form a good specific distinction between it and the sprat; but it will be found that this is not the case, for a herring less than six inches in length is as distinctly serrated on the belly with thirty-six teeth,[*] between the ventral and anal fins, as a sprat of equal size; but as the herring increases in size, so the serratures become obliterated, and, by the time the fish reaches to the length of eight inches, the belly will be found to be no longer serrated, but carinated.

The most prominent specific distinction of the herring, from the sprat, white-bait, and pilchard, is in the position of the dorsal fin, which is placed exactly in the middle of the fish, half way between the point of the upper jaw, and the end of the longest caudal ray.

Dr Knox considers the food of the herring, while inhabiting the depths of the ocean, to consist principally of minute entomostracous animals; but it is certainly less choice (adds Mr Yarrell) in its selection when near the shore. Dr Neill found five young herrings in the stomach of a large female herring; he has also known them to be taken by the fishermen on their lines, the hooks of which were baited with limpets. I have often found the young of the white-bait and small shrimps in the stomach of herrings when they were not in roe; but when they are about to spawn their stomachs (as is observed in most other fishes at that period,) appear as if empty and destitute of any perceptible food. On the authority of Dr Fleming the fry have even been caught with a trout-fly.[†]

April 18, 1836.

VI.—*The Honey-Bee community. Length of life allotted to its different members.* By Edward Bevan, M. D.

This is a subject upon which, I believe, no precise information has ever been presented to the public. "Cool courage and steady perseverance, crowned with unincumbered leisure," says Dr Evans, "can alone expect to unlock this curious arcanum in Natural History."

The opinions of the ancients respecting it were extremely vague and indefinite. The length of life allotted by *them* to the *working*

---

[*] The serratures can be more evidently perceived when the abdominal scales are removed (as in Fig. 3.) which often project beyond the teeth, and prevent their points from being felt, when the finger is passed from the anal fin towards the pectorals.

[†] On the coasts of the West Highlands, herrings for many years past have been taken with the rod, the hook dressed with a white feather (generally from some of the gulls.) Near Oban, and upon the shores of Mull and Jura, twelve dozens are sometimes taken by a single boat during the evening.—Ed.

bees was from *seven* to *ten* years: in later times, writers on bees have regarded it as not much exceeding *a year*; but the notions of both ancients and moderns, upon this subject, have been purely conjectural. Indeed it appears to be somewhat doubtful, whether the length of life which the former seem to have attributed to individual bees, was not meant to apply to the existence of each bee-community; though the language they make use of fully justifies the former construction, excepting in the case of Columella, who clearly regarded the ten years as applicable to the latter. "Durantque, si diligenter excultæ sint, in annos decem, nec ullum examen hanc ætatem potest excedere, quamvis in demortuarum locum quotannis pullos substituent. Nam ferè decimo ab internitione anno, gens universa totius alvei consumitur."

An intelligent critical writer in the Westminster Review, when remarking upon my own reference to the length of the bee's life, in my Treatise on that insect, expressed his regret that we possessed no positive evidence which could throw light upon it. This gentleman's observations induced me to direct my attention more closely to the subject, first theoretically, then practically; and I shall now proceed to give the result of my inductive reasoning, as well as of my actual observation.

A good family of bees being known to consist of from 12,000, to 20,000, and a fertile queen to breed that number, at least, every year, which, under favourable circumstances, is usually thrown off by swarming, it appeared to follow, as a matter of course, that if swarming were prevented by affording hive-room to the bees, the number during the breeding season would often be more than doubled, and that, if their lives were extended even to the shortest period hitherto assigned them, they would remain in a crowded state till the following spring. But repeated experience has clearly shown that the population of families, which have been thus accommodated with room, if examined in the following winter, do not consist of more than 2000 or 3000. After receiving a great increase in the ensuing spring, they again suffer a similar reduction before the succeeding winter; and this regular alternation of increase and decrease will go on for years, keeping a family that has been duly supplied with hive-room, at about the same average amount at each respective period of the year. This reduction to the smaller number above stated, every successive winter, can only be produced by the old bees dying, and leaving the business of the family to be conducted by young ones; and it affords, I think, conclusive evidence, that the *working-bee's* life is regularly cut off in *less than a year*.

The period at which the queen bee deposits her greatest number of eggs is the spring, and it has been emphatically called *the great laying*. I think the facts above stated amply justify the opinion, that all the bees brought into existence by this laying, die before winter, and are succeeded by those hatched at intervals during summer and autumn, and in mild weather, during part of the winter also. The proportion of eggs deposited by the queen at these latter layings, when compared with the great laying in spring, accounts satisfactorily, upon the theory above stated, for the great disparity in the populousness of a storified or collateral family of bees, at different periods of the year. This view of the matter renders it more than probable, therefore, that *the life of the working bee does not exceed six or seven months*.

In order to illustrate my theory I will give below a summary, which, though not pretending to minute precision, may possess sufficient for the purpose.

Bees constituting a family in February, - - -	3000
Spring bred bees, - - - - -	17000
Summer and autumn do, - - - -	6000
	26000
Removed by death between February and December, -	23000
Thus bringing the family down to the February number,	3000

Thus far I was conducted by theory: a theory which I propounded to my apiarian friends several years ago, and which they all regarded as being invulnerable: I have recently had an opportunity of confirming its *general* correctness by the result of an experiment, the particulars of which I will now detail.

On the 13th of June 1835, I introduced a prime swarm to my mirror-hive, the early proceedings of which bore so close a resemblance to those which occurred to Mr Dunbar, as reported in the Edinburgh Philosophical Magazine, that I need not detail them here. On the first of July, when the queen was in the midst of her laying of drone-eggs, and when the hive was well stored with honey, eggs and brood in all stages, I removed her majesty from the family. Though I watched assiduously from early morn till late at night, for several days, no agitation was perceptible. Still I concluded that the bees were aware of the loss they had sustained, as on the second day I perceived the foundation of four royal cells, which were closely attended to by the workers. The general business of the family went on with as much alacrity as usual, pollen was duly carried in, honey-cells were stored and sealed over, brood cells cleared out and replenished with honey, and, in short, not the slightest evidence was afforded of the absence of the queen. The usual period for enlarging and sealing up the royal cells passed away, but they never proceeded beyond the state of acorn cups. There was, however, no remission in the attention paid to them by the workers. In a few days the young workers began to issue from their cells, and on the 13th of July, I perceived the first issue of drones. From this period both were to be seen emerging daily; the latter continued to come forth till the 25th. This state of affairs somewhat perplexed me, and, as was natural, gave birth to theorizing. Some might have said it was a case of instinct at fault: to me it appeared to be an instance of one instinct overpowering another. I have stated, that on the second day of the queen's removal, I perceived the rudiments of royal cells; I question much whether if, at that time, I had more narrowly inspected the combs, I might not have seen the acorn-cups when I removed her: if so, I should regard this as the cause of failure, for in case of their being found during her majesty's occupancy of the hive, the bees would naturally expect *her* to make the usual deposits in them, and the constant attention which they paid to these cells, by incessantly popping in their heads, gives countenance to the opinion. That such was the expectation of the bees, receives still farther countenance from the situation of these royal cradles; they were constructed upon the edges of the combs, as I believe the *natural* cradles of royalty always are; not formed by the breaking down of *worker-cells*, as is the case when *artificial* cradles are constructed. Admitting this to be a sound view of the matter, it would seem not improbable, considering the populousness of the stock, and the warmth of the weather, that, had I removed the queen a day or two earlier or a day later, one or more royal cradles would have been perfected; as in the first case there would most likely have been a formation of *artificial* ones, and a consequent raising of *artificial* queens; in the latter case there *might* have been a tenanting of the *natural* cells of royalty, and a maturation of *natural* queens. In both these respects I was disappointed; no queen was raised, and yet, though no substitute for the old one was presented to the family, there was no abatement of their watchfulness, nor any relaxation of their diligence.

The circumstances under which this family of bees was placed, appeared to offer a favourable opportunity for ascertaining the age to which the life of the working-bee as well as that of the drone might extend. I knew that all the young workers were hatched within three weeks after the removal of the queen, and all the drones within twenty-four days of that time. I carefully watched the proceedings of the family during the remainder of the year, but till the close of autumn nothing different was noticeable in their proceedings from what would have taken place, if the queen had been with them, excepting that there was no massacre of the drones, nor any deposition of fresh ova; both the store and the brood-cells were richly furnished with honey. The hive was situated in an upper apartment of my dwelling-house, well protected from cold,—the quicksilver in Fahrenheit's thermometer, which hung near them, seldom ranging below 45° and never lower than 43°. The drones began to decline in number towards the end of October, and by the middle of November not a single drone remained. Soon after their extinction there was a gradual but manifest diminution of the working-bees. They continued decreasing till the 30th of December, when only thirteen remained alive: these were quite active on the morning of that day, but before night two of them had expired; the other three, when I retired to rest about eleven o'clock, were moving briskly about upon the comb, but when I rose next morning (31st) they also had closed their career. Apprehending when the family became very much reduced, that so small a number of bees would be unable to maintain a due degree of heat, I not only surrounded the hive with a thick coating of wool, but kept a fire in the apartment night and day, which preserved a regular temperature of between 50° and 60° Fahrenheit.

From this detail it will, I think, appear pretty evident, that the average life of the drone is about four months, whilst that of the working-bee is extended to about six months. It will also appear that their lives are cut off rather suddenly,

> " The race and realm, from age to age remain,
> Time still renewing with new links the chain."

On the extinction of the family I took from the hive nearly twelve pounds of fine liquid honey.

The result of this experiment, as respects the length of the working bee's life, fully confirms, so far as a single experiment can do, the opinion which I had previously formed, and it receives additional strength from another that was instituted by Reaumur. He marked 500 bees in April with red varnish, and saw them alive a month afterwards; but in the succeeding November not one of them could be distinguished. This circumstance, standing alone, cannot be regarded as conclusive; for, in the first place, the red varnish might have peeled off, prior to his last observation, and, in the next place, it is possible that none of the marked bees might have been spring bred; but, taken in conjunction with the facts detailed as having been noticed by myself, illustrating as they do the theory which precedes them, I think it may be received as strongly confirmatory of the opinion that the working bee's life is much shorter than has usually been supposed, as it seems highly probable that at least *some* of the bees marked by Reaumur, if not all, were the produce of the spring laying, and whether or not the varnish and the bees had disappeared together, no doubt he observed in November a very manifest diminution in the populousness of the family.

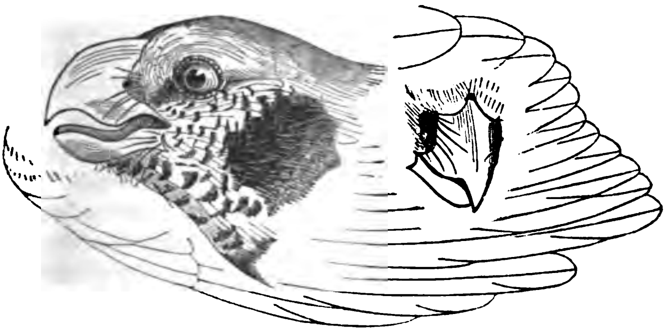
It now only remains that I should advert to the longevity of the queen-bee, and upon this point the evidence which we possess is sufficiently ample to justify a decisive statement. The experiments of Huber, Della Rocca, Dunbar, and Golding, have clearly proved that *her* majesty sees many generations pass away before she quits the stage herself. Huber, though he only speaks positively of her life's being extended to two years, was of opinion, I believe, that it might reach to four or five; and the three latter naturalists, by marking their queens, have traced them from hive to hive, through a period of *nearly four* years; a coincidence, in point of time, which, while it justifies the opinion of Huber, speaks strongly in favour of the diligent and accurate observation of Della Rocca, Dunbar, and Golding. Della Rocca's queen had accidentally lost a leg in being hived, the others were distinguishable by having had one of their antennæ clipped, neither of which bereavements prevented the fulfilment of every royal function.

VII.—*On the Genus Paradoxornis.* By J. GOULD, F. L. S., &c.

CENTRAL ASIA, with its varied regions, constitutes a country, perhaps second to none for the novelties it continues to unfold to the contemplations of the inquiring naturalist; the great elevation of its mountains afford a temperature reduced to that of the arctic regions, while from its comparative southern latitude, its plains possess all the features of the torrid zone. Between these extremes it may be said to represent every variety of temperature. In the rich valleys of various altitudes, coated with the finest alluvial soil, and constantly irrigated by streams from the surrounding hills, such a mass of luxuriant vegetation is produced as can be only imagined by those who have visited this highly favoured country.

The most important inference that has been drawn from our knowledge of this fine portion of the world, is, that temperature rather than latitude chiefly influences the natural productions of any given climate; and this fact has been so completely verified by the observations of various scientific travellers, that I need not here insist upon it. With the knowledge of such a fact, the discovery of birds within the temperate and colder regions of the Himalaya resembling in form those of very different latitudes, but of similar temperature, will not excite much surprise. Indeed it is in regions so vast and little explored as the country of the Himalaya, Nepal, &c., that we may expect to meet with new modifications of forms, which lead us to wonder at the exhaustless variety of nature. The curious bird whose characters are now given, is one of the most singular and novel form which has come under my notice for some years. I have to regret that no information with regard to its habits and natural economy have reached me. I have only as yet obtained a single specimen, and its affinities are so obscure, that I have not been able, with any degree of confidence, to assign its place in the natural system. I must, therefore, content myself with describing its character, and leaving it to the scientific readers of "The Magazine of Zoology and Botany," to draw their own inferences.

Genus PARADOXORNIS, Gould.



GEN. CHAR.—Bill of greater depth than length, the upper mandible strongly compressed, with a sharp and boldly arched culmen, bending to a point, and without a notch, the cutting edge of the upper mandible deeply incurved towards the tip, and produced at the base; *nostrils small and round, situated outside the horn of the mandible;* under mandible broad at its base, stout, and indented so as to fit the edges of the upper mandible; just before and beneath the eye, spring several strong bristles; the same occur, but are more feeble, at the base of the lower mandible; wings short and rounded, fourth, fifth, and sixth feathers nearly equal, and longest; tail moderately long and graduated; feet large, under parts broad and adapted for grasping; toes large, hind toe greatly produced; plumage full and loose.

Paradoxornis flavirostris.

SPECIFIC CHAR.—Bill rich orange-yellow; crown of the head and back of the neck rich rufous brown; the whole of the upper surface, wings and tail, sandy-brown; face and throat white, mottled with black; part of the ear-coverts jet black; upper part of the chest grayish-white clouded with black; under surface pale sandy-brown; tarsi and feet bluish.

Total length, 8 inches; wings, 3⅛; tail, 14½; tarsi, 1¼; hind toe, ⅞. Habitat, Nepal. In the collection of Mr Gould.

VIII.—*The Natural History of British Zoophytes.* By GEORGE JOHNSTON, M. D., Fellow of the Royal College of Surgeons of Edinburgh.

I.—HISTORY OF ZOOPHYTOLOGY.

THE natural productions about to occupy our attention, have been denominated Zoophytes because, according to some, they partake of the nature both of vegetables and animals, and connect the two kingdoms of organized matter; or because, as others define the term, having the outward semblance of sea-plants, they are yet in reality the formations of little animals or polypes that nestle in the cells or tubes of the zoophyte, to which they are organically and indissolubly connected.

Little more than a century has elapsed since the first discoveries were made on which these opinions are founded. Previously to that time zoophytes were considered the undoubted subjects of the vegetable kingdom, naturalists being obviously led to this allocation of them by their arborescent appearances, in which it were vain to trace any likeness to any common animal forms; and by their permanent fixedness to the objects from which they grow, for zoophytes are attached by means of a disk or tubular fibres much in the same way that marine plants are, while the capability of moving at will from place to place was deemed to be the principal character of distinction between the two classes of animated beings. The zoologist claimed none of them, if we except the Actiniæ or animal-flowers, for his province and study, but left them without dispute to botanical writers; and if any of these, in reference to a very few zoophytes of the least arborescent character, hazarded a whispered conjecture that they were wrongly classed, it died away in the utterance, and raised no echo to further inquiry. The only opposition to the botanical theory came from the mineralogists, who some of them questioned the vegetability of such of these productions as were of a hard and stony nature, contending they were rather rocks or stones formed by the sediment and agglutination of a submarine general compost of calcareous and argillaceous materials, moulded into the figures of trees and mosses by the motion of the waves, by crystallization, by the incrustation of real fuci, or by some imagined vegetative power in brute matter. But although not more—perhaps less repugnant to the outward sense than the opposite hypothesis, yet the mineral theory seems at no time to have obtained very general favour or credit; and accordingly we find that, in the works of Tournefort and Ray, the leading naturalists of the age immediately antecedent to the discoveries which led to the modern doctrines, the zoophytes, whether calcareous and hard, or horny and flexible, were arranged and described among sea-weeds and mosses without any misgivings concerning the propriety of doing so.

Ferrante Imperato, an apothecary in Naples, was the first naturalist, according to M. De Blainville, distinctly to publish, as the result of his proper observations, the animality of corals and madrepores; and he is said to have accompanied the descriptions of the species which fell under his notice with illustrative figures of considerable accuracy. His work, of which De Blainville speaks highly as one of the most important in the history of zoophytology,* was printed at Naples in 1599; but although reprinted some years afterwards (1672), it, and the knowledge it contained, sunk into such complete oblivion, that when Peyssonnel, in the year 1727, communicated the same discovery to the Academy of Sciences in Paris, it was received by the members of that learned body in a manner which is sufficient to convince us that it was entirely new to them, and exposed the author to the obloquy and censure which are the usual portions of an original discoverer.

Some time previously to the publication of Peyssonnel's discovery, those who maintained that the stony zoophytes were plants had received a strong corroboration of their opinion from the researches of Count Marsigli, who, having detected the existence of polypes in coral and madrepore, had, under the influence of the fashionable theory, described them as being literally their blossoms or flowers.* Peyssonnel, therefore, had to contend not only against the prejudices of the vulgar based on appearances which spoke direct to the outward sense, but against the actual observations of a naturalist of acknowledged merit; and the observations of Peyssonnel, although numerous and unequivocal, were yet mixed up with so much that was fanciful or erroneous, that it is not wonderful his opinion was received with coldness and suspicion. Reaumur, to whom Peyssonnel's communication was intrusted, even concealed the name of the author when he laid it before the Academy, with the benevolent intention doubtless of shielding him from the scorn and ridicule that might possibly be the lot of one who had ventured to contradict the observations of an Italian Count, and to oppose the established belief;† and he immediately afterwards read, before the same academicians, an essay of his own, in which he opposed the theory of Peyssonnel with numerous objections, and attempted to explain the growth of coral in accordance to the admitted principles of vegetable physiology.‡

---

* Lamouroux on the contrary places Imperato on the same level with Gesner, Boccone, and Shaw—none of whom had any distinct notion of the animality of *any* zoophytes, and had no doubt of the vegetable nature of almost all of them. "Les observations de ces hommes célébres, au lieu d'éclairer les naturalistes sur cette branche intéressante de la science, embrouillaient encore plus son étude."—Lam. Cor. Flex. Introd. p. xiv. The opinions of Rumphius seem to have been as explicitly stated as those of Imperato, but they effected nothing.—Pall. Elench. 14, and 275.

The memoir in which Peyssonnel originally proposed his doctrine does not appear to have been published: the only account I have seen of it is contained in the essay of Reaumur just alluded to. He maintained that what Marsigli had described as the blossoms of coral, were true animals or insects analogous to the Actiniæ or sea-anemones; that the coral was secreted in a fluid form by the inhabitant Actiniæ, and became afterwards fixed, hard, and changed into stone; and that all other stony sea-plants, and even sponges, are the work of different insects, particular to each species of these marine bodies, which labour uniformly according to their nature, and as the Supreme Being has ordered and determined. Reaumur remarks, that these opinions were not entirely the offspring of fancy: it would have been more candid and just had he said they were simply the convictions of a practical naturalist, who had long and patiently studied the productions in question, in their native sites on the coasts of France and of Barbary. Peyssonnel had seen the polypes of coral and of the madrepores; he recognized their resemblance to the naked animal flowers; he had witnessed their motions,—the extension of their tentacula, and the contraction and opening of the oral aperture; he ascertained that, unlike flowers, they were to be found the same at all seasons; that their corruption exhaled the odour; their chemical analysis discovered the constituent principles of animal matters; and that the stony part of them exhibited no trace of vegetable organization: and opinions deduced from such data, abstracting his analogical reasoning of no value and little applicability, might have been sufficient to have attracted at least some attention had his opponent been less influential, or his own reputation and rank somewhat greater.[*]

---

* "Ce fut une découverte qui fit grand bruit dans le monde naturaliste, que celle des fleurs du corail." Reaumur.—Marsigli's work was published in 1711. His name is sometimes written *Marsilli.*—For an account of his works see Haller, Bib. Bot. i. 630.

† "L'estime que j'ai pour M. Peyssonnel me fit même éviter de la nommer pour l'auteur d'un sentiment qui ne pouvoit manquer de parôitre trop hasardé."—Reaumur.

‡ Observations sur la formation du corail, et des autres productions appellées Plantes pierreuses. Par M. de Reaumur.—"Il prend pour une Plante l'ecorce grossiere et sensible du corail, tres-distincte de ce que nous appellons corail, et de plus une autre ecorce beaucoup plus fine, et que les yeux ne distinguent point de la vraye substance coralline qu'elle revêt; et tout le reste du corail, presque toute la substance coralline n'est qu'une pierre sans organisation."—Hist. de l'Acad. Roy. des Sc. 1727. p. 51. and more particularly his own memoir in the same vol. p. 380

The name and doctrine of Peyssonnel lay in this manner unknown and neglected, until the remarkable experiments of Ab. Trembley, in 1741, on the reproductive powers of the fresh-water polypes,[†] and more especially his discovery of the Plumatella, itself a plant-like animal production, while they extorted the wonder and admiration of every one engaged in the study of natural science, were the means of recalling to the recollection of Reaumur the views of Peyssonnel; and he now became forward in promoting such inquiries as seemed likely to confirm and extend them. He himself appears to have repeated the experiments of Trembley, and had an opportunity of observing the habits of the Plumatella; and, as he remarks, since the number of species of animals which are covered by the waters of the sea is much greater than that of the fresh waters, so it seemed natural to presume that not only would polypes be found in the ocean, but in greater numbers and variety than in ponds, rivers or rivulets. To ascertain the validity of this conjecture, and to settle if possible the discrepancy between the observations of Marsigli and Peyssonnel, his friends Bernard de Jussieu and Guettard * proceeded, in the autumns of 1741 and 1742, to different parts of the coasts of France with the view of examining their zoophytical productions; and both were soon satisfied of the truth of the animal theory. Bernard de Jussieu in particular shewed that it was equally applicable to many zoophytes which Peyssonnel had not examined, and whose animality had not yet been suspected, viz. the flexible and delicate Sertulariæ, the Flustra, and the Alcyonium or Lobularia, the latter of which seems to have excited much astonishment by the protrusion of its thousands of polypes of a size large enough to be seen and examined at ease with the naked eye.†

---

[*] Peyssonnel is known solely by this discovery. " M. Peyssonnel, disposed from his youth to the study of natural history, after having qualified himself for the practice of medicine, applied himself with great diligence to that science, to which his inclinations so strongly prompted him, and being a native of, and residing at Marseilles, he had the opportunity of examining the curiosities of the sea, which the fishermen, more especially those who search for coral, furnished him with."—Phil. Trans. He was subsequently appointed Physician-Botanist to " His Most Christian Majesty" in the island of Guadalupe, and had an opportunity of prosecuting his researches on the coasts of Barbary.' He is the author of two or three communications in the Phil. Trans., of which the most interesting is " An account of a visitation of the Leprous persons in the isle of Guadalupe" in the volume for the year 1757.

[†] In the Phil. Trans. for 1742, the reader will find a full account of this discovery.

The memoir which Jussieu presented to the Academy of Sciences in Paris is short, but characterized by great distinctness and precision in the detail of his observations, and illustrated with excellent figures;—his aim being evidently not to entrap our blind assent by a declamatory display of the new wonders opened up in science, but to prove his conclusion to be the true one in the eye of reason and sobriety. He limits his descriptions and remarks to four species, viz. Lobularia digitata, Tubularia indivisa, Flustra foliacea, and Cellepora pumicosa, which seem to have been selected as examples of the more remarkable tribes, for it is evident he had examined many more, but his observations on them were reserved for another memoir which, I believe, was never written.‡—Reaumur's advocacy of

---

* Lamouroux speaks highly of the labours of this naturalist, whose attention seems to have been chiefly directed to fossil polypidoms and to sponges.—Corall. Flex. Introd. p. xvii. See also Hall. Bib. Bot. ii. 341.

† Examen de quelques productions marines qui ont ete mises au nombre des Plantes, et qui sont l'ouvrage d'une sorte d'Insectes de mer. Par. M. Bernard de Jussieu. 14th Nov. 1742. Published in 1745.—See Hall. Bib. Bot. ii. 281.

‡ That Jussieu had ascertained the animality of the Sertulariadæ is, I think, indisputable from the following passage. "Il s'en presentoit ensuite quantite de celles qu'on appelle Corallines, les unes pierreuses dans lesquelles je ne remarquai rien, et les autres dont les tiges et les branches, et ce qui passoit pour feuilles, etoient d'une apparence membraneuse, dans lesquelles je decouvris que ce qu'on y prenoit pour feuilles disposées alternativement, ou dans un sens

the new doctrine was in a more popular style, but not the less excellent: he gave a short exposition of the ascertained facts,—reviewed with the clearness of an eye-witness the discoveries of Trembley,—pointed out their relations to the experiments of Jussieu and Guettard, and how they mutually lent and borrowed strength,—palliated and explained away his former opposition to Peyssonnel,—and declared his complete faith in the animality of Zoophytes, and his conviction that a numerous list of productions hitherto unexamined would be found to be of the same nature. " All that we have said," he thus concludes, " of the polypes of the sea, is merely a sort of advertisement which, however, cannot fail to produce the effect which we promise ourselves from it: it will direct undoubtedly the curiosity of naturalists who reside by the sea to insects so worthy of being better known. They will seek out the different species; they will delight to describe to us the varieties presented in their forms never but remarkable; they will study the figure and disposition of the cells of the various species, their manner of growth and reproduction and wherewithal they are nourished; they will in short place in a clear light every thing that has reference to the different polypidoms and their formation, so that a department of natural history, so interesting, so new, and as yet only sketched in outline, may be rendered as perfect as it merits to be."[*]

The appeal, eloquent as it was and from one having great influence, was however made in vain; for whether from the inveteracy

---

oppose, n'etoit autre chose que de petits tuyaux contenant chacun un petit insecte."—Mem. de l'Acad. Roy. des Sc. an. 1742, p. 292.—Reaumur is still more explicit. : " Après avoir observé dans l'eau même de la mer plusieurs espèces de ces productions si bien conformées à la manière des plantes, il vit sortir des bouts de toutes leurs branches et de tous leurs nœuds, ou de toutes leurs articulations, de petits animaux qui, comme les polypes à paneche d'eau douce, se donnoient tantôt plus, tantôt moins de mouvement, qui comme ceux-ci s'épanouissoient en certains temps, et qui dans d'autres rentroient en entier dans leur petite cellule, hors de laquelle leur partie postérieure ne se trouvoit jamais. Enfin, il (B. de Jussièu) reconnut que plusieurs espèces de ces corps, dont chacun avoit l'extérieur d'une très-belle plante, n'étoient que des assemblages d'un nombre prodigieux de cellules de polypes; en un mot, que plusieurs de ces productions de la mer, que tous les botanistes que les ont décrites ont prises pour des plantes, et ont fait représenter comme telles avec complaisance, n'étoient que des polypiers."—Preface, vol. vi. p. 71, 72. See also Amoenitates Academicæ, Vol. i. p. 185, for an enumeration of the species of Sertularia, &c., which Jussieu had examined, and considered to be animal productions. His account, however, of the animal of the Sertulariæ is altogether erroneous.

[*] Memoires pour servir à l' histoire des Insectes, Tome sixieme, Paris, 1742. Quarto. Preface from p. 68 to p. 80.

of habit and our fondness of opinions long cherished, or from the fewness of the published observations whence the general conclusion was drawn, it seems certain that the new doctrines were everywhere received with doubts and suspicion, and beyond the immediate sphere of the Parisian academy, excited apparently so little interest, that no one was induced to enter into a practical examination of them. Donati indeed shortly after gave a minute and accurate description of the coral and its polypes, and a somewhat less detailed one of the madrepores, but his phraseology being botanical and his opinions unformed, * his researches were of little immediate service to the cause of the zoologists, and perhaps rather tended to support the erroneous hypothesis which they were combating.†

Peyssonnel was still living, and it was impossible that this discussion should not interest him. Accordingly we find that in 1751, he transmitted to the Royal Society of London a MSS. treatise on coral and other marine productions,‡ of which Dr Watson has given a review in the 47th volume of its Transactions, published in 1753. The treatise was sent to the English society, because " that in France some lovers of natural history do attribute and even appropriate to themselves his labours and his discoveries, of which they have had the communication ;"—a charge probably directed against Reaumur, but which the conduct of that illustrious man, so far as appears, did not warrant. The treatise contains upwards of 400 quarto pages, and is the result of the observations of above thirty years, but we

---

* Shortly after this, however, he made other observations which convinced him of the animality of coral. He says—" I am now of opinion, that coral is nothing else than a real animal, which has a very great number of heads. I consider the polypes of coral as the heads of the animal. This animal has a bone ramified in the shape of a shrub. This bone is covered with a kind of flesh, which is the flesh of the animal. My observations have discovered to me several analogies between the animals of kinds approaching to this. There are, for instance, Keratophyta, which do not differ from coral, except in the bone, or part that forms the prop of the animal. In the coral it is testaceous, and in the Keratophyta it is horny."—Phil. Trans. (1757) abridg. xi. p. 83.

† New Discoveries relating to the History of Coral, by Dr Vitaliano Donati. Translated from the French, by Tho. Stack, M. D. F. R. S. (Feb. 7. 1750.)—Phil. Trans. Vol. xlvii. p. 95. Haller characterizes the original as " nobile opus, ex proprio labore natum."—Bib. Bot. ii. 400.

‡ Traité du corail, contenant les nouvelles decouvertes, qu'on a fait sur le corail, les pores, madrepores, scharras, litophitons, eponges, et autres corps et productions, que la mer fournit, pour servir à l'histoire naturelle de la mer. By the Sieur de Peyssonnel, M. D. Correspondent of the Royal Academy of Sciences of Paris, of that of Montpelier, and of that of Belles Lettres at Marseilles. This treatise was never published.

find in it no facts in support of his theory additional to those already mentioned, for the greater portion of it is occupied with many details on the medical uses and other applications of coral which have no relation to the question at issue. It seems at first to have excited considerable attention among the members of the Royal Society, but Peyssonnel's endeavours were doomed ever to be unfortunate, for whatever favour his theory was likely to receive here was nipt in the bud by the opposition of Dr Parsons, a naturalist of considerable eminence, and an active member of the society. The analysis of Peyssonnel's treatise was read in May 1752, and in June of the same year, Dr Parsons read his answer,* which savours much of the supercilious dogmatism of a sceptical philosophy. He does not pretend that he had tested the doctrine of Peyssonnel by any experiments or observations, nor does he question his veracity, but he chose to consider the animals observed by Peyssonnel in the coral and madrepores as merely accidental settlers which had nothing to do with their growth, there being no "seeming power, proportion, and stability" in the polypes to render them capable of performing such works as they were thought to have done. "And indeed it would seem to me," says the learned Doctor, "much more difficult to conceive, that so fine an arrangement of parts, such masses as these bodies consist of, and such regular ramifications in some, and such well-contrived organs to serve for vegetation in others, should be the operations of little, poor, helpless, jelly-like animals, rather than the work of more sure vegetation, which carries on the growth of the tallest and largest trees with the same natural ease and influence, as the minutest plant."

But the progress of truth, although it may be delayed by opposition, cannot be permanently arrested. The converts to the new doctrines were indeed few, but much had been done to facilitate their future reception, for the slumber of prejudice had been broken, the hold of the ancient opinions on the affections had been loosened, and men no longer startled into scepticism when they heard of animals that in their productions mimicked the most beautiful and delicate vegetable forms.† The mind of naturalists was thus in some measure prepared for the change on the very eve of being effected by the labours and assiduity of a member of that very society which had lately listened, with apparent approbation, to the reveries of Dr Parsons.

---

* A Letter from James Parsons, M. D. F. R. S. to the Rev. Mr Birch, Secr. R. S. concerning the Formation of Corals, Corallines, &c. For an account of Dr Parsons's writings see Hall. Bib. Bot. ii. 340; and there is a short biographical notice of him in Phil. Trans. abridg. viii. 692.

† "For it is not because an opinion is true, that others will therefore adopt it. It must at the same time be congruous with our other impressions, and admit of being dovetailed into them, or it will be rejected; for it is judged of by its

John Ellis—the name of the individual alluded to—was a merchant in London, who devoted his leisure to the study of natural history, in which he attained so considerable knowledge as to gain easy access to the Royal Society, and the acquaintance and correspondence of the most celebrated naturalists of his time. He seems to have attached himself more particularly to the economical department of botany, and seized every opportunity to introduce foreign plants to our gardens, especially such as were remarkable from furnishing any material employed in the arts and manufactures; and he was equally solicitous to acquire and diffuse accurate information relative to any natural productions which might be rendered subservient to the necessities or comforts of mankind. He was fond also of amusing himself in making imitations of landscapes by the curious and skilful disposition of delicate sea-weed and corallines on paper: and it was this amusement that directed his enquiries into the nature of the latter, for, attracted by their beauty and neatness, he was induced to examine them minutely with the microscope, by the aid of which he immediately perceived "that they differed not less from each other, in respect to their form, than they did in regard to their texture; and that, in many of them, this texture was such, as seemed to indicate their being more of an animal, than vegetable nature." These "suspicions," as he modestly terms them, were communicated to the Royal Society in June 1752; and, encouraged by some of the members, he prosecuted this enquiry with such ardour, and care, and sagacity, that in August of the same year, he had fully convinced himself "that these apparent plants were ramified animals, in their proper skins or cases, not locomotive, but fixed to shells of oysters, mussels, &c. and to Fucus's."*

---

conformity to the previous acquisitions, and is disliked and condemned if incompatible with them."—Turner, Sac. Hist. of the World, vol. ii. p. 19.

* See the Introduction to his Essay on the Corallines of Great Britain. It is from this work, and from the valuable "Selection of the Correspondence of Linnæus, and other naturalists, from the original manuscripts, by Sir James Edward Smith," 2 vols. 8vo. Lond. 1821, that I derive my account of Ellis's opinions. Sir J. E. Smith commences his memoir by saying—"John Ellis, F. R. S., illustrious for his *discovery* and complete demonstration of the animal nature of Corals and Corallines, was a native of Ireland." We have seen that he has no claim to this discovery, though he himself seems to have thought so, and never makes mention of his predecessors in the same field. A Professor Butt-

Ellis, however, was not forward to publish his discovery: he waited further opportunities to confirm the accuracy of his first observations, and to institute other experiments to remove whatever appeared hostile to the doctrine, which at length he fully explained to the members of the Royal Society in a paper read before them in June 1754; and it was made more generally known in the following year by the publication of his "Essay towards a natural history of the Corallines, and other marine productions of the like kind, commonly found on the coasts of Great Britain and Ireland;"—a work so complete and accurate that it remains an unscarred monument of his well-earned reputation as a philosophical inquirer, and is even to this day the principal source of our knowledge in this department of natural history.* In several essays presented subsequently to the Royal Society, and published in their Transactions, he continued to illustrate and extend his opinions, and defended them so successfully against his opponents, that they soon came to be very generally adopted.

There was nothing unformed nor mystical in Ellis's opinion. Certain marine productions which, under the names of Lithophyta and Keratophyta, had been arranged among vegetables, and were still very generally believed to be so, he maintained and proved with a most satisfactory fulness of evidence, to be entirely of an animal na-

---

ner at Gottingen, who had been in England, and become acquainted with Ellis, who calls him an "excellent botanist," unhesitatingly claimed Ellis's discoveries for his own, but a more bare-faced literary theft has not been recorded, and its detection has rendered the name of the German Professor infamous.—Lin. Corresp. vol. i. p. 170. and 179.—For a list of Ellis's writings the reader may consult Hall. Bib. Bot. ii. 433, and the Introd. to Soland. Zooph. p. viii.

* The concluding paragraph of this work may be quoted as throwing light on the character of this great naturalist—"And now, should it be asked, granting all this to be true, to what end has so much labour been bestowed in the demonstration? I can only answer, that as to me these disquisitions have opened new scenes of wonder and astonishment, in contemplating how varioulsy, how extensively life is distributed through the universe of things: so it is possible, that the facts here related, and these instances of nature animated in a part hitherto unsuspected, may excite the like pleasing ideas in others; and, in minds more capacious and penetrating, lead to farther discoveries, farther proofs (should such be wanting,) that One infinitely wise, good, all-powerful Being has made, and still upholds, the whole of what is good and perfect; and hence we may learn, that, if creatures of so low an order in the great scale of nature are endued with faculties that enable them to fill up their sphere of action with such propriety; we likewise, who are advanced so many gradations above them, owe to ourselves, and to Him who made us and all things, a constant application to acquire that degree of rectitude and perfection, to which we also are endued with faculties of attaining."

ture—the tenements and products of animals similar in many respects to the naked fresh-water polype. By examining them, in a living state, through an ordinary microscope, he saw these polypes in the denticles or cells of the zoophyte; he witnessed them display their tenacula for the capture of their prey,—their varied actions and sensibility to external impressions,—and their mode of propagation; he saw further that the little creatures were organically connected with the cells and could not remove from them, and that although each cell was appropriated to a single individual, yet was this united "by a tender thready line, to the fleshy part that occupies the middle of the whole coralline," and in this manner connected with all the individuals of that coralline. The conclusion was irresistible—the presumed plant was the skin or covering of a sort of miniature hydra,—a conclusion which Ellis strengthened by an examination of the covering separately, which, he said, was as much an animal structure as the nails or horns of beasts, or the shell of the tortoise, for it differs from "sea-plants in texture, as well as hardness, and likewise in their chemical productions. For sea-plants, properly so called, such as the Algæ, Fuci, &c. afford in distillation little or no traces of a volatile salt: whereas all the corallines afford a considerable quantity; and in burning yield a smell somewhat resembling that of burnt horn, and other animal substances; which of itself is a proof that this class of bodies, though it has the vegetable form, yet is not entirely of a vegetable nature."*

Ellis taught no novel doctrine, but he gave it fixidity and currency; and he moreover applied it to those very zoophytes which possessed the vegetable appearance in the most perfection, many of which he was the first to notice, and which he illustrated with a series of figures of unequalled accuracy.† He rarely went beyond the mere statement of the facts witnessed, or what seemed an unavoidable inference from them; but, perhaps, he deserted his usual caution when, from analogy principally, he asserted that the articulated calcareous corallines (Corallina, *Lin.*) and sponges, of a very different structure from coral, madrepore, or the horny corallines, were also like them, manifestly the places of abode of different species of polypes. In the former (Corallina) he had indeed detected some slender fibres which, it was presumed, might be parts of polypes, but this observation he was never able to confirm, and it was rather because of the porous structure of the corallines, than from any thing else, that he inferred the existence of polypes in them,—a structure which he had examined with minute accuracy and shown to be essentially different from any known vegetable tissue,—and, secondly, because of their chemical constituents, of which he procured an accurate analysis to be made.—With regard to the Sponges, Ellis, as Peyssonnel had previously done, supposed at first that the regular holes observable in dry specimens, strongly indicated their being once filled with animals; but when after repeated examinations of recent sponge, he could detect none, this conjecture was abandoned, and so thoroughly was he afterwards satisfied of the non-existence of animalcules, that he combated the opinion of those who maintained the contrary, pointing out where the error lay in mistaking small insects which had crept into the sponge in search of food or shelter for the real inhabitants and fabricators of the zoophyte. Yet not the less was Ellis convinced of its animality;—its chemical constituents and its structure were to him conclusive proofs of this fact, particularly when added to the signs of irritability he saw them exhibit when in a fresh state. "I am persuaded," he writes to Linnæus, "the *fibræ intertextæ* of sponges are only the tendons that enclose a gelatinous substance, which is the flesh of the sponge. Mr Solander and I have seen the holes or sphincters in some of our sponges, taken out of the sea, open and shut while they were kept in sea-water; but discovered no animal like a polype, as in the Alcyonium manus mortui." And again—"I attended last summer in pursuit of the animals in sponges, but believe me there are none: but the whole is an animal, and the water passes in a stream through the holes, to and fro, in each papilla."*

---

* Dr Good is in error when he states that the ammoniacal smell from burnt zoophytes was the *principal* fact for placing them in the animal kingdom.—Book of Nature, i. 175 and 210.

† As mentioned above, Bernard de Jussieu knew that the Sertulariadæ—the zoophytes here alluded to—were animal productions, but no detailed account of his observations seems ever to have been published. Trembley had made the same discovery. Dr Watson, in his account of Peyssonnel's treatise in 1752, tells us that Mr Trembley shewed him, "at the late excellent Duke of Richmond's," the small white polypes of the Corallina minus ramosa alterna vice denticulata of Ray, "exactly in form resembling the fresh-water polype, but infinitely less." "When the water was still, these animals came forth, and moved their claws in search of their prey in various directions; but, upon the least motion of the glass, they instantly disappeared." P. 463.—Linnæus, however, in reference to the observations made previous to Ellis, says they are "inchoatæ, non ad plenum confectæ, et desiderentur adhuc quam plurima, quæ dies forte revelabit."—Amoen. Acad. vol. i. p. 186.

---

* Lin. Corresp. vol. i. p. 161, and p. 163. In a subsequent letter Ellis explains himself more fully. "I am now looking into the nature of sponges, and think by dissecting and comparing them with what I have seen recent, and with the *Alcyonium manus mortua*, that I can plainly see how they grow; without trusting to Peyssonell's account of them, which is printed in our Philosophical

When Ellis published these discoveries, which form in fact an epoch in the history of natural science,* Linnæus was in the zenith of his reputation,—the "prince of naturalists," as his followers loved to style him,—from whose decision on all disputed points in natural history, there was scarcely an admissible appeal. And Linnæus almost merited this distinction, for he was a man not only of superior capacity and acquirements, of great sagacity, ready apprehension, and fruitful fancy, but he was also of a candid and liberal disposition; and the ingenious labours of Ellis received from him great and merited commendation. He had previously, in the belief that lime was never formed but by animals, placed the Lithophyta in the animal kingdom; and he now adopted the opinions of Ellis so far as to include in it the horny and flexible polypidoms also, but at the same time he broached the conjecture, for it deserves no higher praise, that these were really intermediate between the animal and vegetable kingdoms, so that it could not be said they properly belonged to either. The animalcules of the Lithophyta, like the testaceous tribes, he said, fabricated their own calcareous polypidom, forming the whole mass into tubes, each ending on the surface in pores or cells, where alone the animal seems to dwell; † but the polypes of the proper Zoophyta, so far from constructing their plant-like polypidoms, were, on the contrary, the production or ef-

---

Transactions, wherein he pretends to tell you, that he takes the animal out of them, that forms them; and that he put it into them, and it crept about through the meanders of the sponge. This kind of insect, which harbours in sponges, I have seen; but sponges have no such animals to give them life, and to form them. Their mouths are open tubes all over their surfaces, not furnished, like the tubes of the *Alcyonium manus mortua*, with polype-like mouths or suckers. With their mouths they draw in and send out the water; they can contract and dilate them at will, and the Count Marsigli has (though he thought them plants) confirmed me in my opinion, that this is their manner of feeding. If you observe what he has wrote on sponges in his Histoire de la Mer, and the observations he has made on the Systole and Diastole of these holes in Sponges, during the time they are full of water, you will be of my opinion. Take a lobe of the officinal sponge, and cut it through perpendicularly and horizontally, and you will observe how near the disposition of the tubes are to the figure I have given of the sections of the Alcyonium manus mortua in my plate of the Sea-Pens."—Lin. Corresp. vol. i. p. 79–80.

* The Royal Society adjudged to Ellis the Copley medal, "as the most public mark that the Council can give of their high sense of the great accession which natural knowledge has received from your most ingenious and accurate investigations." The medal was delivered to him, Nov. 30, 1768, by Sir John Pringle, the President.—Soland. Zooph. Introd. p. xi.

† Lithophyta—"animalia mollusca, composita. Corallium calcareum, fixum, quod inædificarunt animalia affixa."—Syst. 1270.

florescences of it, * just as the flowers do not make the herb or tree but are the results of the vegetative life proceeding to perfection. Polypes, according to this fancy, bore the same relation to their polypidom that flowers do to the trunk and branches of the tree; both grew by vegetation, but while the one evolved from the extremities blossoms which shrunk not under external irritations and were therefore properly flowers,—the other put forth flowers which, because they exhibited every sign of animality, were therefore with reason considered animals. "Zoophyta," he writes to Ellis, "are constructed very differently, living by a mere vegetable life, and are increased every year under their bark, like trees, as appears from the annual rings in a section of the trunk of a Gorgonia. They are therefore vegetables, with flowers like small animals, which you have most beautifully delineated. All submarine plants are nourished by pores, not by roots, as we learn from Fuci. As zoophytes are, many of them, covered with a stony coat, the Creator has been pleased that they should receive nourishment by their naked flowers. He has therefore furnished each with a pore, which we call a mouth. All living beings enjoy some motion. The zoophytes mostly live in the perfectly undisturbed abyss of the ocean. They cannot therefore partake of that motion, which trees and herbs receive from the agitation of the air. Hence the Creator has granted them a nervous system, that they may spontaneously move at pleasure. Their lower part becomes hardened and dead, like the solid wood of a tree. The surface, under the bark, is every year furnished with a new living layer, as in the vegetable kingdom. Thus they grow and increase; and may even be truly called vegetables, as having flowers, producing capsules, &c. Yet as they are endowed with sensation, and voluntary motion, they must be called, as they are, animals; for animals differ from plants merely in having a sentient nervous system, with voluntary motion; nor are there any other limits between the two. Those therefore who esteem these animalcules to be distinct from their stalk, in my opinion, founded on observation, deceive and are deceived." †

---

* Zoophyta—"animalia composita, efflorescentia. Stirps vegetans, metamorphosi transiens in florens Animal."—Syst. 1287. "Zoophyta non sunt, uti Lithophyta, auctores suæ testæ; sed Testa ipsorum; sunt enim corpora (uti flores) imprimis generationis organa, adjectis nonnullis oris motusque instrumentis, ut motum, quem extrinsecus non habent, a se ipsis obtineant."—Syst. Nat. edit. 10. 799. When Berkenhout translates the first of these definitions—"stems vegetating and changing into animals;" Synop. i. 15, he certainly departs, if not from the letter, yet from the meaning of Linnæus.

† Lin. Corresp. vol. i. p. 151-2.

There was something in this hypothesis peculiarly captivating to an imaginative mind, and few poets have possessed a richer fancy than Linnæus. He seems to have ever fondly cherished the opinion, for in his curious Diary, in which he has enumerated with much complacency all his works and merits, it is mentioned as one of his principal recommendations to the respect of posterity. "Linnè," he says, "decided that they (zoophytes) were between vegetables and animals: vegetables with respect to their stems, and animals with respect to their florescence. This idea is still entertained." * Before we notice the manner of its reception by Ellis, we may take a short review of the writings of some other of the opponents of the latter naturalist.

Ellis had indeed effected a revolution in the opinions of scentific men, but there were some even of considerable reputation who either wavered between the old and new, or continued to hold the notions of their fathers, † which, however, very few ventured to maintain publicly. Of these the only one who merits our particular notice is Dr Job Baster of Zurichsee in Zealand, who seems to have been very imperfectly qualified for the task he had undertaken. At first he boldly asserted the vegetability of all zoophytes, attempted to prove that the Sertulariæ were really articulated Confervæ, and that the little animals observed on them were merely parasites, which had as little to do with the formation of the object they rested on, as the maggots in a mushroom had to do with its moonlight growth. These the results of his actual observation were set forth in a tone of arrogance calculated to wound the feelings and good fame of Ellis, nor is this conduct to be wondered at, for ignorance is usually as unfeeling as she is proverbially confident in her assertions, and the Dutch naturalist was truly very ignorant of all relating to the subject he attempted to elucidate. Unskilled in marine botany he actually mistook the objects of the enquiry, and instead of Sertulariæ set himself to examine true Confervæ,—a fact which the drawings illustrative of his paper demonstrate. His further experiments made him fully aware of this ridiculous error; and having become better acquainted with his subject, he appears to have been puzzled what to make of zoophytes; they were certainly not sea-weeds,—and it were too humiliating to adopt a once rejected theory,—when happily the Systema Naturæ came to his aid,

---

* Pulteney's General view of the Writings of Linnæus, by Dr Maton, p. 560. Lond. 1805.

† Count Ginanni was one of these, and had the hardihood to question the accuracy and observations of even Jussieu.—See Hall. Bib. Bot. ii. 444.

and he instantly adopted with zeal the vegeto-animal fancy, because, he says, it illustrated in a wonderful manner other things which were previously obscure and incomprehensible, and because it was in perfect keeping with the doctrine which taught that animated beings were a series of links constituting one long chain that could not be broken without violation to the continuity of organization,—the different species being so closely connected on this side and that, that neither sense nor imagination can detect the line which separates one from the other. It must be allowed that in Baster the doctrine of Linnæus has found its best advocate. He tells us that in zoophytes there are too many signs of a perfect vegetation to permit us to believe that they can owe their origin to animalcules so minute as to require a microscope to see them, and the great simplicity of whose organization altogether unfits them for perfecting such works: and as from the law of continuity indicated above it was reasonable to presume the existence of beings in which the distinctions between animals and plants should meet and amalgamate, so by a comparison of their definitions it may be made obvious that these distinctions disappear in zoophytes. A plant is an organized body without sense or spontaneous motion, adhering by means of a root to some foreign substance whence it derives the material of its life and increase: an animal, on the contrary, is an organized body endowed with sensation and perception, which can, of its own free will, make certain movements peculiar to itself. Like the plant, zoophytes grow fixed by a root; and yet at the same time they are animals, for they shew when touched that they feel by some motion, and when they perceive food proper for them they seize and devour it by the action of certain members.

Having in this manner commended the theory to our favour, and shewn its reasonableness and consonance to nature, Baster goes on to explain the manner in which he conceives his experiments prove that the Sertulariadæ or flexible corallines grow. The ova or seeds of these zoophytes, he asserts, pululate from the body of the mother in the likeness of tender articulations or new branches, which fall off on maturity, and adhere to any stone, shell, or other hard body, by which they are protected until the young are excluded. Now the outer coat of this egg or seed is of a *vegetable* nature, and it throws out from the sides, in the manner of other seeds, certain little roots by means of which it remains permanently attached; but the internal part of the egg or seed is *animal*, and growing simultaneously with its vegetable covering, it is dispersed through all the ramifications and occupies their hollow interior, being developed into polypes in the lateral denticles and extreme cells. Such was the deduction he came to from observations made on the growth more especially of the Sertularia abietina, which he had kept alive for nearly four months in a vessel of sea water. When a new part was formed, there first emerged from the stem a minute tubular joint, which rose to four, five, or even eight lines in height: after some days some lesser buds, regularly disposed in an alternate manner, were seen on the sides of this branch, which in the course of four or six days grew into cells containing perfect polypes. Hence it is obvious to Baster that the stem of this and similar zoophytes grows in thickness and length as plants do, and that the medullary pith is animal, which it is not wonderful should assume a dendroidal form, when we see zinc and quicksilver do the same by the mere force of affinity. Trembley had already pronounced the cells of the fresh-water zoophytes (Plumatella) to be not the work of the polypes, but rather compartments in which they concealed a part of their body; and this fact, added to those already given, makes it certain that the animalcules of the Sertulariadæ are entirely passive, and have no more to do with their polypidoms than the flower has with the increase and growth of the herb. *

There is some ambiguity in Baster's statement of his opinions, for it is not very obvious whether he believed the new formed branchlets to be themselves the eggs or seeds, or whether they only contained the eggs; but be this as it may, it appears scarcely doubtful that he knew nothing of the true ova and their curious ovaries. The phenomena observed in the production of new parts are correctly stated, but nothing but wilful prejudice could blind him to the fallacy of the consequent reasoning. The analogy attempted to be drawn between the eggs of zoophytes and the seeds of plants has no existence, for every tyro knows well that the coat or skin of seed in no instance ever pushes forth radicle fibres, or ever exhibits any sign of vegetation;—it is a dead part which is cast off or corrupts, and exerts no further influence on vegetation than as a protection to the cotyledons and embryo which it invests, so that if it is true that the coat of the ova of zoophytes is the source of their vegetative part, as Baster says, that coat must be of a very different nature from the skin of seeds. It would have been better to have compared the oviform bodies of the zoophyte with the buds of the tree, and he might have disported with this fancy to some effect, for there are many analogical resemblances, and the inapplica-

---

* Phil. Trans. vol. lii. p. 108–118.—For Baster's works see Hall. Bib. Bot. i. 468.

bility of the illustration is not so very plain. Still it is inapplicable, for buds grow from the absorption of water and inorganic matter which is diffused and assimilated by means of a certain determinate organization, while the covering of zoophytes receives no increase except through the medium of its polypes;—it has no sap-vessels, no spiral tubes, no cellular parenchyma, no absorbent roots, no pores and spiracles on the surface, so that all its material must be derived from an internal source; and to say that a body vegetates when the nutriment is received and assimilated in a different manner and by a different structure from what it is in plants, and is productive in its assimilation of opposite principles, is to use terms in so vague a sense as would be intolerable in any science.

Neither the authority of Linnæus, nor the imperfect experiments of Baster had any effect on Ellis, who steadily opposed this vegeto-animal doctrine, and whose superior knowledge made it easy for him to detect and point out the erroneousness of the observations on which it principally rested. In reference to the opinion itself he wrote to Linnæus,—" artful people may puzzle the vulgar, and tell us that the more hairy a man is, and the longer his nails grow, he is more of a vegetable than a man who shaves his hair or cuts his nails;* that frogs bud like trees, when they are tadpoles; and caterpillars blossom into butterflies. These are pretty rhapsodies for a Bonnet. Though there are different manners of growth in the different parts of the same animal, which the world has long been acquainted with, why should we endeavour to confound the ideas of vegetable and animal substances, in the minds of people that we would willingly instruct in these matters?"† And in a subsequent letter he repeats, "I cannot reconcile myself to vegetating animals: the introduction of the doctrine of this mixed kind of life will only confuse our ideas of Nature. We have not proof sufficient to determine it; and I am averse to hypotheses."‡

---

* Bohadsch in answer to those who believed that the Pennatulæ were plants uses the same argument.—De Anim. Mar. p. 123. This author, who wrote in 1761, was a strenuous advocate for the unmixed animality of zoophytes.

† Lin. Corresp. Vol. i. p. 226. ‡ Ibid. p. 260.

(To be continued.)

REVIEWS AND CRITICAL ANALYSIS.

I.—*Iconographia della Fauna Italica.* Di CARLO LUCIANO BONAPARTE, Principe di Musignano. Folio. Parts 1 to 12. Rome. Agent in London, Havell, Oxford Street.

WE cannot describe the pleasure with which we undertake the office of introducing this valuable and most interesting work to such of our readers as may not have met with it. A few years ago, whilst revelling in the enjoyment of the amenity and tranquillity the imperial city affords, and regaling in the feasts afforded by the daily inspection of its masterpieces of ancient and modern art, it never occurred to us, that we should be so soon called on to announce the commencement of a new era, in the facilitating the researches of those who vary the scenes of mental relaxation, by the pursuit of natural science. The lead in this most desirable change has been taken by the Prince of Musignano, who is better known to the public by the more familiar, and to our ears, we confess, more agreeably sounding name of Charles Bonaparte. His father Lucien, as is well known, has long been settled in the Papal states, where he is a landed proprietor, and after resisting the temptations of high titles, offered in the great and palmy state of the empire, has retired with the rank of a Roman noble. The public are likely to be very much indebted to him for the discovery and investigation of antiquities, which have been found on his lands in the ancient Etruria, and will probably prove of great importance in clearing up parts of the ancient history of Italy. Of that numerous family, all of whom are possessed of talent, and are well educated, with the desire of distinction inherent in them, we believe the Prince of Musignano alone has given his time to the regular and systematic pursuit of natural history.

After the disaster of 1815, the Prince accompanied some part of his family to the United States, where his well-known work, " the continuation of Wilson's North American Ornithology," was published. He returned to Europe in 1828, and immediately afterwards gave the "Spechio Comparativo," a little comparative sketch of the birds of Rome with those of North America, to which a supplement was added. Subsequently, a system of classification of the animal kingdom, with remarks on that of Cuvier, and some minor opusculi, were printed at Rome, but we believe these works were principally, if not wholly, intended for private distribution amongst his friends.

In the winter of 1832–33, the present more serious undertaking was commenced. It consists of a selection of the new or remarkable species in the Mammalia, birds, fishes, and reptiles, of Italy and the adjacent countries, which are given in coloured lithography, with descriptions in the vernacular idiom. The work may be classed amongst those "of luxury," in the phrase of our neighbours. The size is folio, the printing admirable, and reflects the more credit on the Roman typography, that it is the first attempt on that scale and subject. The policy of the Papal government has always been to discourage printing, and in consequence, the profits of an art which would appear to be particularly suited to the place, have been abandoned to the Tuscans and Lombards, who have almost monopolized the printing even of the standard classic works, to which no inquisitorial objection could be made, whilst the public press of Rome has been chiefly employed in the most common-place work of missals or breviaries, more for the use of the strangers than of the natives, for whom a very small supply of these articles is sufficient. The editing a work of this sort, and passing it through the hands of such assistants, is of course considerable, and enhances the interest of it. The same remark applies to the designs, which were executed under the personal inspection of the Prince; and his draftsmen making their first essay in this work, and his villa, (which formerly belonged to Paulina, the Princess Borghese, and is situated just within the walls,) when his assistants were at work resembled a small academy. The fish and reptiles are the best executed, the quadrupeds are good, the birds perhaps the most defective, clearly owing to the difficulty, even to the experienced hand and eye, of seizing and embodying the graceful, lively, and ever-changing attitudes of the feathered part of the creation. The style is excellent, the clearness and ductility, as well as extreme conciseness of the Italian, adapting it singularly to the uses of natural history.

The work commences with a plate and description of the common fox of Rome and the vicinity, which the Prince has made out to differ from the Canis vulpes, the inhabitant of our own islands, and of the centre and north of Europe, and to which he has given the name of Canis melanogaster. The chief organic difference appears to be in the size of the head, which, instead of being one-fourth of the length of the body as in C. vulpes, approaches to one-third. The fore paws are much shorter than in the other species, whilst those behind are equal, thus making the respective difference of the fore-arm greater. The ears are shorter than in the C. vulpes; and Professor Savi has noticed a peculiarity, which, if it be constant, is rather singular. The young of the C. vulpes, when first whelped, have the hair long and whitish, whilst in the new species it is short and of an ash-gray colour. We may add that, in our own opinion, the proportions and general appearance of the animal are different; the head being larger, and the tail very bushy, alter his port and bearing. The Roman fox in winter has the under parts of the belly, breast, tail, back of the ears, part of the paws, and under jaw, black, the other parts of the body being tawny. In summer the black parts change to white, thus inverting the general order of nature as we approach the north. On this winter colour the name has been founded; but independently of the general objection to the adoption of colour as a distinctive appellation, there are two very strong ones to using it in this instance; the one, that it is by no means constant, the same individual varying in intensity of colour from one year to another, probably from age, or health, or diet, the other that in Nilson's Fauna Scandinavia, an individual of C. vulpes is figured which had precisely the colour of the C. melanogaster; and within our observation we remember assisting at the death of a fox which had been maimed by a trap; it had a quantity of black in different parts of the body, differing very much from the common appearance of its brethren. For these reasons we think the name had better have been selected from some of the points of organic difference, than from the fleeting and uncertain one of colour. The author considers that his species resembles the C. fulvus of Desmarest, an American fox, more nearly than any other. The C. Niloticus of the French Institute, might be supposed to be identical, from the contiguity of regions, but the osteology of the head is different, in the latter species.

The limits of the habitat of C. melanogaster are not yet exactly defined, but would appear to be those of the great southern zone of Europe, which comprises Italy south of the Apennines, Greece, the south of Spain, and the Islands of the Mediterranean. Like the peasantry in other places, the Romans consider that there are two species of the common fox, the one not eatable, the other, which is called, "Leprene," probably from its fancied resemblance to the flavour of the hare, being admitted to the table. Not having made the trial, we agree with the Prince, "de gustibus," &c.

We were not surprised at this distinction of species, having long suspected that the timid, half-domestic animal of the campagna of Rome although our earliest acquaintance as the fox of Æsop and Phædrus, was of inferior caste to our noble reynard, which, in fact, would scarcely acknowledge his congener if he knew his habits. So cowardly are they, that our young countrymen at Rome, after establishing a pack of hounds, and struggling through several seasons with the perseverance of John Bull in his favourite diversion, found it impracticable to raise a run, and were forced to adopt the more humble but sure mode of obtaining sport, by turning off a cur at some distance from the city, and following him over hedge and ditch as he made his way back to his hovel. We speak feelingly on this subject, as it was a serious inconvenience to those whose avocations obliged them occasionally to use the steeds of the Piazza del Popolo, which were constantly either engaged at double prices, or lamed in consequence of their exertions at the Caccia Inglesa.

We are indebted to Professor Savi of Pisa for the interesting discovery of the species of mole which is beyond doubt the Ασπαλαξ of the ancient Greeks, and has the appearance and reputation of being blind, whence the appellation, Talpa cœca, has been conferred on it.

In general external character and appearance there is no difference between this species and the T. Europæa, which infests our fields. The Professor considered it to be smaller, but his specimens were brought from the high Apennines, where in all probability food is more scarce than in the plains, and the Prince has found that in a number of specimens taken in the campagna of Rome there was no difference in this respect.

There is a small dissimilarity in the dentition, which we should scarcely look for in species differing so little as these two. In T. Europæa the incisors are all equal, but in T. cœca, the two anterior teeth are longer than the others. The striking distinction, however, is in the eye being covered entirely by an unperforated bare skin, through which the black is seen on close inspection. At first sight it would appear that this skin would preclude the power of vision; but we have no doubt whatever, that the animal possesses the power of dilating this membrane, and, however imperfect, has the light necessary for its use, when it choses to extend it. It is highly probable the vision is as good as that of its congener, whilst the eye is better protected. It may not be easy to prove, but we think it not impracticable to ascertain exactly whether it be so, and we wish the Professor had proved his mole to be blind before he conferred an appellation the poor animal most probably does not deserve. Its name drawn from antiquity would have been more appropriate in every respect—why not Talpa aspalax or Talpa Aristotelis?

The habitat is probably the same as that of the C. melanogaster, but is not yet exactly ascertained.

In the third number we have a species of rat, which in Italy represents the Mus rattus, the old English rat, now so nearly extinct. Neither species are indigenous in their respective countries, nor of long standing, although their origin and time of introduction are not certainly known. Like the black rat its territories have been invaded by the Mus decumanus (our common rat), but, being stronger and more courageous than its congener, it has escaped extermination by that ruthless race. In many places they occupy the same ground, but are at all times in a state of determined hostility. The Italian species differs from M. decumanus in the length of the tail, which is greater than that of the head and body together, and from M. rattus with which it has that characteristic in common, in colour and other particulars. It would appear to resemble the M. Alexandrinus of Geoffroy, an Egyptian species, but the Prince has never been able to compare them together. We owe the separation of this species from that of M. rattus, with which it had always been confounded, to Professor Savi. The name of M. tectorum, equivalent to that of the trivial one in Tuscany, has been assigned to it, from its living a good deal about the roofs of the houses. It sallies into the gardens during a part of the year, and in general, haunts dry situations, differing from the M. decumanus, to which every one wet or dry seems alike indifferent.

The region inhabited by it seems to be that south of the Apennines, the M. rattus occupying the plain of Lombardy and circumjacent countries. The origin is unknown, as before mentioned, and its introduction modern. The ancients appear only to have been acquainted with the common mouse (Mus musculus); but we have no doubt, it, has with so much of good and evil been imported from the East.

In a subsequent number we have an account of the Arvicolæ, field rats and mice, which are properly separated from the Mures, or those addicted to living in or about habitations.

The Mus terrestris of Linnæus, Arvicola terrestris of our author, which was supposed to be principally confined to the neighbourhood of Strasburg, is common in many parts of Italy, especially near Grosseto, a district in the maremme of Tuscany, which was an almost uninhabitable marsh until very lately, when extensive drainage has restored it to cultivation, like Leghorn and some other parts of the same territory. Its habits are half amphibious, and in this description of country it is dreadfully destructive to the embankments, by burrowing and destroying the newly made works. Like the water-rat, which it very nearly resembles in many particulars, its excavations are made principally with the mouth, the claws being little used, the burrows are long and parallel to each other, with side galleries.

The food is exclusively vegetable, and its ravages are so great in gardens and vineyards by gnawing the young shoots, that the price paid for its destruction at Rome, is one-half more than that of the mole, and twelve times that of the short-tailed field-mouse, which is only four times smaller. They are taken by a hollow tube, which is placed at the entrance of the burrow, the passage being obstructed by a bundle of grass, in eating through which an elastic rod is loosened, and the animal taken by the neck. It appears to change the habitat according to the rains, leaving the low country when it is inundated, and gradually advancing as the waters subside. It is a favourite food of many animals, especially of the foxes, which watch at night in the gardens, and on hearing them work in the burrows, suddenly scratch in and take them out, thus destroying plants and causing other serious damages—in addition to that committed by the rat itself.

The Arvicola arvalis, short-tailed field-mouse, is common in Italy, and in some parts is taken in almost incredible numbers.

The water-rat, Arvicola ampihibia, is also very common. It differs from the A. terrestris, besides other respects, in being extremely carnivorous.* The head is shorter, and the muzzle more pointed than in its congener, and there are differences in the dentition, which are carefully pointed out and engraved.

The common marten, Mustela martes, is not uncommon near Rome, frequenting even the hot and burning region at the mouth of the Tibur, where it is found in the lofty stone pines of the villas there.

The common otter, Lutra vulgaris, also inhabits the Tibur and Anio, being found occasionally even within the walls of Rome, where it is most acceptable in Lent, the strange and convenient doctrine being admitted that these animals, as well as some sorts of wild fowl, are cold-blooded, and consequently admissible as food on the fast days!

The mufflon, muffione or musmon, Capra musmon, is engraved and described in the ninth number. It is no longer found in the Italian peninsula, as it formerly no doubt was, and we are not satisfied that it exists in the European Continent, unless it be in some part of Turkey. There are still a few in Corsica and Sardinia. It claims to be the parent of the common sheep, but the number of joints in the tail, which in the C. musmon are twelve, whilst in the domestic sheep they are nineteen or twenty, are almost conclusive against their identity, and in the absence of absolute proof, we should be disposed to favour the claim of the Argali, the Capra Ammon of Fischer, the native country of which is Tibet and Tartary, where in all probability it was brought into subjection by the ancient race of shepherds long before the discovery of the European species.

---

* In Britain the A. amphibia is almost entirely herbivorous.—Ed.

In the ophidians, the author has adopted a modification of the arrangement of Wagler. The Colubrini, comprising the harmless serpents of Europe, is subdivided into Natrix, which has the scales carinated. They are chiefly aquatic in their habits. Coronella, which has the body very taper and the tail long, the scales of some being carinated, and others not. They principally inhabit trees. While Coluber includes those with the scales imbricated and smooth, the tail being of moderate length.

The first reptile described is the Coluber Riccioli of Metaxa a physician, who published a monograph of the Roman serpents, and we believe first described it. It is one of the most beautiful, and at the same time one of the most harmless and gentle of the tribe. It is so mild in disposition, that with difficulty it can be made to open its mouth when irritated. It is found in Monte Mario, in the suburbs of Rome, but it is not common. It has also been seen on the banks of the Garonne, probably inhabiting some of the intervening countries.

We were truly happy to find this species named after a most worthy and indefatigable individual, to whose zeal the naturalists at Rome are very much indebted. He had paid considerable attention to the reptiles, and we remember when visiting his repository, which was a most curious miscellany of objects collected in various parts, seeing a chest filled with living serpents, that were placed there to hybernate, for the purpose of making observations on their changes. As he discovered this Coluber, it was justly ascribed to him.

The Natrix gabina is another elegant species. The name was at first given in consequence of its being found amongst other localities at the small lake which fills an extinct crater near the site of the ancient Gabii. In a later number this name is corrected, the Prince having subsequently been satisfied that it is identical with the Coronella tessellata of Laurenti, the Coluber tessellatus of Gmelin, &c.

The habitats, which were at first supposed to be rather restricted, are now known to be considerably extended, comprising parts of Germany, Hungary, Spain, and France. The length is about three feet. There is no difference in colour between the sexes. The back is a bottle green, with symmetrical rows of dark spots; the under parts with dark spots on a light yellow ground, and red intermixed.

It inhabits ditches and similar situations, is extremely shy, and difficult of capture even to the most expert hunters of serpents.

The Coluber flavescens—is of considerable size, some specimens measuring forty inches. The back is dark green with white cross-shaped spots, the under part being of light greenish-yellow. The young differ extremely from the adults.

This is one of the species which claim the honour of being the attendant of Esculapius, but the Prince thinks without foundation. That named after the god of medicine by Linnæus is an American reptile, and that on which Lacepede bestowed the appellation had no better title than because it came from Rome. Whichsoever be the real species, we apprehend it must be sought for in Greece.

It inhabits all parts of Italy, living mostly in marshy meadows and about trees. We suspect it is found beyond the Alps; a very large snake killed by us in a watery lane near Stang in Switzerland, some years since, as far as we can recollect, perfectly answering the description.

Three beautiful plates are given of the Coluber viridiflavus, a large and active reptile, which is found over the whole of the south of Europe. The author has seen a specimen four feet in length. It is the most common species near Rome, living even within the walls, and we can testify from ocular observation its activity in the capture of its prey. Amongst the plates is a variety of dark colour, which has been described as another species by the name of C. carbonarius. The author seems to think that reptiles living in mountainous districts assume a darker colour than those inhabiting the plains, a subject which is well worth the investigation as to the causes, and whether it be constant.

The Natrix elaphis is the largest European Ophidian, a specimen of five feet eight inches in length not being considered extraordinary. This is the reptile which is conjectured by Metaxa to have been that which is recorded to have swallowed a child on the Vatican mount in the time of Claudius, the body being taken out of the stomach uninjured. We do not think it at all incredible, and more likely to be true than otherwise. We remember seeing a very young child deposited on the pavement of a church at Lisbon, quite naked, to wait until some charitable person should order it to be buried, which a very moderate sized snake might have swallowed, had it met with it in its haunts. This species is only seen in the south of Italy, and has not been observed even in Lombardy.

The Coluber leopardinus receives its appellation from the disposition and colours of the spots in its skin. It is the most beautiful of the European serpents, and is extremely gentle in its nature. The plate is well executed, and we believe it is the first time it has been figured. The principal habitat is Dalmatia, and it was supposed to be confined to that country, until Riccioli found it near Otranto. The best and almost only specimens are at Vienna. It is rather of large size, a moderate specimen measuring three feet four inches.

The Natrix torquata, our common hedge snake, is figured, with an excellent representation of the head in a state of expansion which the animal has the power of giving it.

The Natrix viperina, a species which inhabits Sardinia, and the South of France and Spain, has not yet been seen in Italy. It is the Coluber viperinus of Latreille, and is of small size.

The Coluber hippocrepis, which was described by Frederic Linnæus as an American species, was brought from Sardinia to the late Professor Bonelli of Turin, and by him described as new, and called Coluber sardus and C. diadema. The author believes it to be identical with a species brought from Algiers, and called by the French C. diadema. It is common in Sardinia and in Florence, but has not been seen in Italy.

The section of Vipers is one of exceeding interest. The author separates the sub-family of Viperina into six genera, two only being European. Vipera is separated from the Crotali, by the want of the fossets behind the eyes, which distinguish that deadly group.

The vipers are slow, their motions being almost exclusively horizontal, owing to the formation of the vertebræ, but they are capable of raising the head quickly to strike or wound, and we apprehend it is their principal mode of capturing their prey. They are unable to dart or spring forward, like some of their congeners. We give a specimen of the style in the description of this form.

" Oltre le già accennate sonovi altre condizioni comuni alle specie del genere Vipera, che meritano d'essere riferite piu alla distesa. Il capo è assai distinte dal tronco, di figura piriforme, depresso posteriormente, qualche poco compresso verso il dinanzi; di sopra è appena convesso, non vestito di scudetti, ma d'un vario numero di squame picciole, ovate o ovate lanceolate, ottusa, irregolari nella forma e nella disposizione, tutte convesse; quelle collocate nel tratto anteriore al vertice prive de carena, le restante segnate da una carena longitudinale risentita, talvolta alcune di quelle poste dietro al punto intermedio fra gli occhi hanno proporzioni alquanto maggiori delle altre, ma fur sono imbricate e non rassembrano scudetti."

The author remarks, that, in the vipers and all other serpents, the male has the tail longer than the female, a want of attention to which character has given rise to the creation of new species; and added to the confusion already existing in the arrangement of these animals. The first viper described is the V. ammodytes, the peculiar distinction of which is in the muzzle being turned up somewhat in the manner of the horn of the rhinoceros. It is extremely venomous, being reputed to be more so than the common species, and in spring it is said to be dangerous to pass near it. It inhabits the Morea, Dalmatia, Hungary, and has been met with near Ferrara.

The Vipera aspis of Merrem and of our author, the Coluber aspis of *Linnæus*, is the common viper of Italy, and of the south and centre of France. The colour varies extremely, and of four plates in which eight individuals are admirably delineated, no two are alike. This is one and a natural cause of the confusion which exists even amongst the best writers in the accounts of these reptiles, and one of the many good points in this work is the number of synonyms and authorities which are given.

On the poison of this species the celebrated experiments of Fontana and others were made. We believe, after all, that the best and easiest cure is by immediate suction; care of course being taken that there are no open wounds or ulcers abouth the mouth. In all cases, the widest difference is produced by the age of the animal, the season of the year, or probably the *animus* with which its wound is inflicted; and still more important is the habit of body of the recipient, and the part where the poison has been injected. We know the serious and sometimes fatal effects that have resulted in this country from the sting of a single wasp or bee.

These reptiles are some years so numerous in the flat and marshy country below Massa di Carrara, that the entering the woods is attended with danger to the peasantry. In these cases we have been informed the mode resorted to is that of turning in herds of swine, which pursue them with such avidity, that in a very short time the nuisance is entirely abated.

The genus Pelias differs from Vipera in the head being depressed and extended backwards; it is covered with convex scales, and the snout is a little turned up. In Pelias the head is oval shaped, less depressed, and less sensibly separated from the body. It is covered with scales, which are flat or very slightly convex. The snout is flat and not relieved or turned up from the muzzle. In the words of the au-

thor "Solo in pochi punti differiscono fra loro i generi Vipera e Pelias. Laddove nel primo il capo è depresso, allargato posteriormente, coperto nella parte superiore di piastre o piuttosto squame convesse, lo spigolo rostrale è risentito, prominente sull' apice del muso; il Pelias ha il capo ovale, men depresso e men sensibilmente distinto dal tronco, coperto superiormente di scudetti piani anzi leggermente concavi, lo spigolo rostrale non è risentitó, nè rilevato affalto sull' apice del muso." Subsequently he observes of Pelias:

"I moti di queste sono in paragone men lenti; l'indole loro è piu fiera ed al solito riescono assai piu pericolose, perchè, anche senza essere provocate, impetuosamente si slanciano e mordono."

This would appear to be the viper of Ray and Pennant, the Coluber berus and prester of Linnæus, C. chersea and Vipere commune of Cuvier, the Æsping of the Swedes, &c. &c. The number of names which have been collected by the Prince as synonyms of this species are remarkable, and we must say, not reconcilable to each other in all instances. The Vipere of Cuvier, for instance, does not agree with the reptile figured in this work. We have given the characters at length, in order to draw the attention of the reader to the elucidation of this genus. We strongly suspect that both Pelias and Vipera are to be found in this country. The writer of these observations has frequently killed the common viper on the moors in Northumberland, which is a very dark-coloured, slow and sluggish animal, moving from its coil when disturbed with great difficulty, and, it has always been found, basking in sunny dry places. On one occasion, whilst shooting in a district upon the Reed near the Carter Fell, in a deep fern bed, he met with a reptile, which in colour, form, and activity, differed so much from any he had seen before or since, that he was satisfied it was different from the common species. It was so active that there was great difficulty in securing it, and it bit at the gunstock with uncommon virulence, but being at the time more intent in the pursuit of game than on that of natural history, he neglected preserving it. However, it agreed in every respect with the Pelias berus now described, and it is mentioned for the purpose of drawing the attention of those who may have opportunities of attending to the subject.

The common name of this animal in Italy is, Marasso palustre, to shew its habits of frequenting marshy districts, where it avoids the sun, keeping in the shade excepting in the early morning. It swims with great facility. It has not yet been seen south of the Apennines, but is found beyond the Alps. In the colouring in some of the lower parts there is a *citrine yellow tint*, which was one of the peculiarities noticed in the specimen above-mentioned, which we never saw in what we call the common viper. In the Vertebrated Animals of Jenyns, which we have recently examined, it seems almost certain that amongst his varieties there are two species. Colour or size prove nothing, but the shape of the head, though loosely mentioned, is strong presumptive proof. Another Pelias is figured under the name of P. cherua, or Marasso alpino. A very small individual has furnished the description, and was brought from the mountains of Abruzzi, in the neighbourhood of Ascoli, where it inhabits dry stony places. We hope that, in a subsequent number, we shall have more ample information, for at present we do not think ourselves quite justified in admitting it to be a species.

We must defer the notice of the Ornithology and Ichthyology to another opportunity, having already extended this article quite sufficiently. We could wish that, in the subsequent numbers, some of the rarer birds, such as Turdus Naumanni, Turdus atrogularis, which are at Turin, the Sterna leucoptera, found by us at Rome, the Sylvia conspicillata, which the Prince met with near Civita Vecchia, were figured, as they possess some interest to the English reader who may not have access to the continental collections. We should likewise be glad to know whether the Accentor montanellus of Temminck really exists in the localities he mentions. We were not successful in seeing or hearing of it either at Rome or Naples.*

II.—*The English Flora.* By Sir J. E. Smith, M. D., F. R. S., &c. Vols. i.–iv. 1824–1828.

The British Flora. By W. J. Hooker, LL.D., F. R. S., &c. Vol. i. 3d Edition, 1835.

The English Flora. Vol. v. part i. (Or, the British Flora, Vol. ii. Part i.) By W. J. Hooker, LL.D., F. R. S., &c. 1833. Same works, Vol. i. Part ii. By W. J. Hooker, and Rev. M. J. Berkeley, M. A., F. L. S., &c. 1836.

Much as the botanical productions of the British isles have been investigated and written upon, during a period of nearly two centuries, we do not yet find the subject to be at all exhausted, either of interest or of novelty. Taken collectively, British botanists are yearly adding to the stores of their knowledge concerning the plants of their own country, whilst, individually, their numbers are rapidly increasing through the hosts of new votaries attracted, or (by the converting powers of some medical college) compelled, to become worshippers of the gentle goddess, whose name now stands so conspicuous on so many botanical title-pages, and, for whose honour, such countless thousands of fair and fading flowers are annually metamorphosed into the more enduring and brunette mummies of the herbarium. Economists, without being very political, are sufficiently aware that an increasing number of consumers soon leads to an increased production of the articles consumed, to competition, to improved quality, and to cheapness;—advantages pressing upon each other in rapid succession. Thus has it been with the works descriptive of British botany, dating from the publication of the first volume of the English Flora, in 1824. Never before has there been so large a number of purchasers; never so many new, or newly arranged, works; and never so much of diversity and excellence in plan, arrangement, and execution. It would seem that we have now reached the point when a new Flora, in the full sense of the term *new*, has become impossible, and when there is scarcely any space left for thrusting in a newly dressed one. The two Floras, named at the head of this article, stand pre-eminent in utility to British botanists. The *English Flora* will long rank as a standard work of consultation, both on account of the number and accuracy (generally speaking) of the synonyms and references to other authors, and on account of the full and original descriptions of species. But this work being too bulky for the valise of the tourist, and too expensive for the pocket of the young student, a *Compendium of the English Flora*, was published in one thin 12mo volume, containing little more than the specific descriptions taken from the larger work, with the duration, time of flowering, and usual situation of each species, expressed by abbreviations. The same course had been followed with the *Flora Britannica*, of which the English Flora may be looked upon as an improved and enlarged translation. The smaller work, however, was insufficient without access to the larger, and the larger work was inconvenient in use without the smaller and more portable one. As a teacher of botany, it appears that Dr Hooker felt the want of some intermediate work, including sufficiently complete descriptions for enabling a student easily to determine the species, without being swelled to a voluminous size by references of little value to mere students. This happy medium, it must be allowed, has been successfully hit upon by the author of the *British Flora;* who has compressed into a single 8vo volume all the most essential points of description spread through the four volumes of the English Flora, besides effecting considerable improvements in some of them. So far, these works included only the flowering plants, belonging to the first twenty-three classes of the Linnean system, with the order

---

* In the Supplement to his Manual, M. Temminck concludes his remarks upon Acc. montanellus " de passage accidentel en Hongrie, *et plus accidentellement encore dans le midi de l'Italie.*"—Ed.

Filices of the class *Cryptogamia*. Death having prevented Sir J. Smith from continuing the English Flora through the Cryptogamic class (which appears to have been his wish,) Dr Hooker, with the assistance of others who have made cryptogamic plants their especial study, has now completed both the English Flora and British Flora, by the publication of one thick volume in two separate parts, the first part extending from the *Musci* to the *Algæ*, and the second part being devoted exclusively to the *Fungi*. This volume we are told to receive as the fifth and last of the English Flora, or, as the second and last of the British Flora. Though "ENGLISH FLORA, VOL. V." does figure in large letters on the title-page, the plan of the volume altogether corresponds with the plan of the British Flora, and is widely different from that of the English Flora; so that we are disposed to esteem it really the second volume of the former, and to receive it only as a nominal continuation of the English Flora:—a continuation, be it observed, which the learned author of the English Flora might have well been proud to acknowledge as his own. In this view of the double-titled volume,—a view pointed out by truth and justice, although it may not so well suit the booksellers' fancy, *Hooker's British Flora* must now be regarded as the only complete work on British plants; that is, complete as respects the knowledge acquired by botanists, not as respects the actual productions of nature; since there appears not a chance that we shall ever attain to complete knowledge of cryptogamic plants, and even yet, novelties are discovered every year among the conspicuous and much-hunted flowering plants.

A hasty glance over the steps, by which the literature of descriptive botany has arrived at its present stage of superiority and encouragement in Britain, will elucidate our remarks on the works before us. In the preface to the English Flora, we have a brief historical sketch of the older works in this department of botany, commencing with the *Phytologia* of Dr How, in 1650, and coming down to the publication of the Flora Britannica, in 1800; with notices of a few of the more recent work. It appears that fourteen descriptive Floras were published during this period of one hundred and fifty years. Amongst these, *Ray's Synopsis* and *Withering's Arrangement* reached to third editions, and *Hudson's Flora Anglica* and *Berkenhout's Synopsis* came to second editions; thus making twenty publications in all. To this number we may add about half a dozen others, the names of which appear in catalogues, though not mentioned in the historical sketch; and also the first edition of *Hull's British Flora*, if published in 1799. Of this latter work, a second edition has since appeared. The *Flora Britannica* and *Compendium* of Smith, a translation of the latter by Galpine, *Thornton's British Flora* (a work known to us by name only,) *Gray's Natural Arrangement of British Plants, Salisbury's Botanist's Companion*, the two works at the head of this article, the *Compendium of the English Flora, Lindley's Synopsis of the British Flora*, in two editions; with five full-sized editions of *Withering's Arrangement*, and three smaller ones by Macgillivray, make up a number of publications, inclusively of different editions, during the present century, equalling the whole number of those heretofore published; and two-thirds of which have appeared in the course of the last twelve years. The two standard works of plates, illustrating our native species, *English Botany* and the *Flora Londinensis*, were commenced in the last century; but a new issue of the former is now in progress. Other illustrative works are also publishing in periodical numbers.

We may date the present era of British botany from the publication of the first volume of the English Flora, in 1824; since it cannot be doubted but this work gave a decided impulse to the study of British plants, by presenting a standard and authoritative work, in our own language; calculated to supersede that of Withering; which was useful enough in its day, but is now almost obsolete as a work of science, although bearing a name still very good for the book-market. The latter works, now in regular use, are those of Lindley, Hooker, and Macgillivray; all, probably, founded upon and partly copied from the English Flora. We do not say this in objection to these works, it being impossible to make an original Flora of Britain; and we apprehend that Mr Macgillivray has been the more judicious in not copying Withering too implicitly. Dr Lindley published his *Synopsis of the British Flora* much about the same time (a year earlier, by the title-pages and preface) that Dr Hooker was preparing his British Flora. It differs from the Compendium of the English Flora, chiefly by following the example of Gray, in making an entire change of arrangement from the Linnean to the Jussieuan system, improved and modernized into what is now known as the "Natural System." The introduction of characters or descriptions of the orders necessarily accompanied this change, as well as many alterations in the descriptions of genera, with some few amendments in those of species. Frequent changes of name are also made; but the specific definitions are mostly copied from Smith's works. On the whole, there is a good deal of instructive novelty in the synopsis; but having been stereotyped, farther improvement is prevented, and editions succeeding to the first will fall behind the science of the day. Macgillivray's work follows the Linnean arrangement, is popular through its title, and, in its utility to students, may be fairly enough classed with its three competitors, though wanting the authority which an established botanical name, in the author, gives to each of the others.

We have entered into these particulars with a view of showing the relation, if it may be so expressed, which the several Floras bear to each other, and for supplying hints to persons desirous of selecting only one or two; as it cannot usually happen that the same person should require all of them. Macgillivray's is the most elementary; Lindley's is the only one entirely arranged according to the natural system; Hooker's may safely be said to contain the best and fullest description of species among these three; while the English Flora, to full descriptions of the genera and species, unites the most complete set of references and synonyms; and, though in its full size the most expensive, its Compendium is the least so.

The advances made in our acquaintance with British plants since the publication of the first volumes of the English Flora, are considerable. When the fourth volume was published, seven additional species were added for the earlier volumes. The first edition of the British Flora, published two years later, in 1830, added about a score of others. The second edition, in 1831, contained seven or eight more, and the last edition increases the lists by above a dozen species. Five or six others are now known; so that, in the last ten or twelve years, about fifty species have been added to our list of flowering plants, and the additions to the cryptogamic lists may be reckoned by hundreds. But our readers must not imagine that fifty undisputedly native species of flowering plants have been discovered during this period. In fact, scarcely the half of this number can be regarded as fixed species and undoubted natives; and even some of these had been heretofore found, though mistaken or forgotten. Among the most interesting and least questionable additions, may be instanced Isnardia palustris, Orobanche caryophyllacea, Erica mediterranea, Erica ciliaris, Elatine hydropiper, Carex Vahlii, Potamogeton prælongus, Statice plantaginea, Astragalus alpinus, and Trifolium resupinatum.—But Pinguicula alpina, Cotoneaster vulgaris, Scirpus Savii, Silene italica, Hymenophyllum Wilsoni, and, probably, Habenaria chlorantha, had been previously observed and mistaken for other species. Tragopogon major, Oenanthe apiifolia, Fedia eriocarpa, Fedia mixta, Rosa Wilsoni, and others, appear scarcely entitled to rank higher than varieties. Asperula arvensis, Althæa hirsuta, and Lepidium draba should be looked upon as introduced species.

We fancy that persons fond of hunting out small blemishes, may find in the pages of the British Flora some few occasions for enjoying such amusement; which will surprise no one who considers the multitudinous avocations of its author. Such enjoyment we willingly leave to those who love it, and offer to the work, as a whole, our almost unqualified approbation; its plan is good; enough, and not too much is said in describing the species; and while the descriptions are sufficiently clear and simple for students, there is also matter calculated to fix the attention of professed botanists. The nice discriminations of Messrs Arnott, Wilson, and Borrer, appear in many places in the first volume; in the second volume, we may add to them the names of Greville, Harvey, Berkeley, Carmichael, Purton, and Mrs Griffiths, as contributing largely to it. The second part of this volume seems to have been confided almost entirely to the Rev. M. J. Berkeley, and much of the first part is properly attributable to Dr Greville and Mr Harvey;—we allude more particularly to the *Algæ*. With such a combination of skill for the different departments, it is impossible that the work should be otherwise than very valuable:—it is an admirable example of the advantages attendant on a division of labour, but union of talent.

We do, notwithstanding, object strongly to some points. In the first place, the names and descriptions of several species are still introduced, as if really belonging to British plants, although there is not a shadow of evidence to prove that such species have ever been found in Britain, and positive certainty that some of them were originally introduced into our Floras by mere blunders. Again, names and descriptions of imaginary species are still repeated, although relating to what are now known to be varieties, some of them very trifling varieties, and others so inconstant as to have become extinct, unless in the case of specimens preserved by "the curious." Such names and descriptions are said to be retained "in deference to the opinion" of one or other botanical authority, and contrary to the opinions of the author of the Flora. We dislike deference carried so far. It is the sacrifice of science to superstition,—of fact to fancy,—of truth to error. Such sacrifices operate as the dead-weights and drag-chains of improvement, moral as well as intellectual. This fault is, indeed, found in all our Floras; but it ought to be amended, and the author of the British Flora is the fittest person to set the example.

TRANSACTIONS AND PERIODICALS.—*British.*

The Edinburgh New Philosophical Journal. Conducted by Professor JAMESON.—January to April 1836. Edinburgh: A. & C. Black. (Part 2d of Vol. xx.) 8vo.

I. *Zoology.*

P. J. SELBY, Esq. "On the Quadrupeds and Birds inhabiting the county of Sutherland, observed there during an excursion in the summer of 1834, p. 286."—Contains a notice of the birds which were observed during the above-mentioned excursion, a similar notice of the Mammalia having been communicated in a preceding Number. The most worthy of remark are:—the occasional occurrence of the jerfalcon, (F. Islandicus,) the skin of a recently killed bird being procured at Keoldale. Muscicapa grisola was seen on the confines of the county, its most northern observed station in Scotland. Salicaria phragmites, Curruca cinerea, Sylvia trochilus were observed to the northern extremity of the county. Linaria montium takes the place which L. cannabina does in the lowlands, and is abundant. A bird considered to be Tetrao rupestris was shot on the Benmore range. Totanus glottis was found breeding. Also Anser segetum, Mareca penelope and Fuligula marilla. Colymbus arcticus was frequent, breeding on the more retired lochs.——J. V. THOMSON, Deputy-Inspector of Hospitals. "Memoir on the star-fish of the genus Comatula, demonstrative of the Pentacrinus Europæus, being the young of our indigenous species," p. 295, with a plate.—An interesting memoir, detailing some very curious information regarding the supposed states of the above-mentioned animal. The evidence, however, though good, and most probable to be hereafter proved, is more circumstantial than direct.

II. *Botany.*

Sir EDWARD FRENCH BROMHEAD, Bart.—Remarks on the arrangement of the natural botanical families, p. 245.—The author's object in the arrangement which he proposes is, "to bring together the greatest possible number of admitted affinities, and if possible in continuous succession."——Dr GRAHAM, list of new and rare plants which have lately flowered in the neighbourhood of Edinburgh, chiefly in the Royal Botanic Garden, p. 412.—"*Poinsettia.*—Involucrum monophyllum, androgynum, basi 5-loculare, extus appendiculatum, nectariferum; flores pedicellati, nudi, masculi bifariam in singulis loculis, ordonati, monandri; feminei solitarii, germen trilobum, ovulum solitarium singulis lobis."—Formed by Dr Graham from the Euphorbia pulcherrima of Willd. Rediscovered in Mexico by Mr Poinsette, and sent by him to Charleston in 1828, afterwards to Mr Buist of Philadelphia, whence it was brought to the Royal Botanic Garden of Edinburgh, by Mr J. Macnab in 1834.——*Sceptranthes.*—"Tubus clavatus erectus; limbus suberectus; filamenta tubo adherentia, alternatim breviora; antheræ lineares, erectæ prope faucem tubi subsessiles; stigma trifidum, erectum; germen capitatum." S. Drummondii, (Zephyranthes Drummondii, Cooperia Drummondii.) "The length of the tube, and especially the adhering filaments, seem to me to remove the plant from the genus Zephyranthes; the greater shortness of the tube, the less flattened limb, and the stipitate germen, prevent me from uniting it to the genus Cooperia." *Gr.* Bulbs were sent from Texas by Mr Drummond.

The Magazine of Natural History, and Journal of Zoology, Botany, Mineralogy, Geology, and Meteorology. Conducted by J. C. Loudon. Lond. Jan.—April, 1836. 8vo.

This was, perhaps is to many, an entertaining and a useful miscellany, though latterly it has been declining in the interest and in the value of its communications. Such a large collection of facts, however, in relation especially to British Zoology and Botany, is brought within its volumes, that they must necessarily be consulted by every one who in future undertakes the history of our Fauna or Flora: but we will hint that much caution is necessary in the consultation, for the statements often rest on the testimony of those who have obviously begun to communicate the result of their researches before a sufficient experience has taught them all the difficulties and deceptions to which even a field-naturalist who attempts no more than to note down his observations is liable. With the present year the ninth volume commenced, and four numbers of it are before us, whose botanical and zoological contents we shall merely indicate.

I. *Zoology.*

Rylands on the Quinary or Natural System of M'Leay, Swainson, Vigors, &c. pp. 130 and 173. Mr R. does not seem to us competent to discuss the very difficult question he has ventured upon.——Wood on the propriety of altering established scientific names in Natural History, p. 138.——Waterton on the Brown or Gray Rat (Mus decumanus,) p. 1. A clever sketch, but too much interwoven with politics and satire.——Moss on the habits of a domesticated White Rat, p. 182.——On the habits of the Robin Red-breast, p. 6.——Ord on the Cow Bunting of the United States of America, p. 57.——Waterton on the Titmouse and the Woodpecker, p. 74.——Waterton on the Habits of the Jay, p. 187.——Taylor on the Birds of the Alleghany Mountain Range, p. 72. ——On the arrival of the summer Birds of Passage in the neighbourhood of Carlisle during the spring of 1835; to which are added observations on some of the scarcer Birds obtained in the same vicinity from November 10, 1834, to November 10, 1835, p. 185.——Templeton's Catalogue of Irish Crustacea, Myriapoda, and Arachnoida, p. 9.——Johnston on Astacilla longicornis, p. 80: and on Chordrocanthus lophii, p. 81.——Johnston on Limapontia nigra, p. 79. ——Forbes's Notices of Species of Naticidæ, p. 191. The figures illustrative of this paper are very unsatisfactory. In Natica monilifera, Mr F. has never found more than *one* tentaculum: has the male organ of generation not been mistaken for such?——Johnston on Psamathe fusca, p. 14, a new genus of Annelides; and on Planaria subauricula, p. 16, a supposed new species of the genus.

II. *Botany.*

Watson on the construction of Maps for illustrating the distribution of Plants, p. 17.——Walsh on Symphysis in Plants, p. 83.——Gardiner on the uses of the Nectary and Corolla in Plants, p. 195.——Henslow's Enumeration of Species and Varieties of Plants which have been deemed British, but whose indigenousness to Britain is considered to be questionable, p. 88.——Bromfield's notice of Habitats of some rare British Plants, p. 85.——Mallet on the seeddispersing apparatus of Erodium moschatum, p. 22.——THOMPSON on the Irish Algæ, p. 147.——BABINGTON'S Observations during a visit to Connamara and Joyce's Country, Ireland, in August 1835, p. 119.——MUNBY on the Natural History of the neighbourhood of Dijon in France in 1835, p. 117.——FORBES'S Natural History Tour in Norway, p. 169.

TRANSACTIONS AND PERIODICALS—*Foreign.*

Annales des Sciences Naturelles. Zoologie, MM. AUDOUIN et MILNE-EDWARDS. *Botanique,* MM. AD. BRONGNIART et GUILLEMIN. Crochard and Co. Paris, Janvier 1836.

I. *Zoology.*

Dr BRESCHET, *Recherches Anatomiques et Physiologiques sur l'organe de l'ouie dans les oiseaux.* Two plates.—M. Breschet is the author also of a previous "Memoire sur l'Oreille des Reptiles," and proposes to continue the subject by another upon the more decidedly aquatic species. The present paper is divided into two sections, the first, historical, giving an account of the observations and researches upon the subject from Casserius in 1609 to Windischmann in 1831. The second contains a detailed description of the organs of hearing in birds, explained by two plates, and endeavours to illustrate, that there is a representation of all the parts which are found in the Mammalia, and a very close alliance in structure to many parts in the aquatic reptiles. The parts of *Corvus corax, Strix stridula and flammea, Meleagris gallopavo and Diomedea exulans,* are used for illustration.——MARTIN SAINTANGE, *Recherches sur les Villosites du Chorion des Mammiferes.* This is a short extract from a paper read before the sitting of the Academie des Sciences.

II. *Botany.*

MM. EDWARDS and COLIN. *Memoire de physiologie agricole sur la vegetation des Céréales sous les hautes Temperatures.*—A very interesting memoir to the vegetable physiologist and agriculturist. The experiments were made chiefly in the open air by sowing the grains at different seasons, and thus to a certain extent imitating the heat of warm climates. The principal results were; 1. that the weight, size, and quality of the grain sown had considerable influence under high temperature in its mature development; and 2. that the Cerealia of the North of Europe lose their power of mature development between 18° and 20° Centig. That they then continue in the blade only, which becomes large and luxuriant, and would form a thick and rich pasture. These experiments come nearly to what Humboldt had noted from observation on the Andes of America.——M. AUGUSTE DE SAINT HILAIRE—*Lettre sur un primula omis dans les flores de MM. Duby et Loiseleur, et sur la famille des primulacées.* The primula in question grows near the village of *Vernet,* and also around Montpelier, and was considered as only the P. officinalis; a comparison along with M. Dunal of Montpelier, has, however, made them out to be the P. Columnæ of Tenore—(P. suaveolens, Bertoloni,) and it appears to have been omitted in the Flora alluded to. The remainder of the letter is chiefly in answer to observations which have been made upon the author's "Memoire sur le Placenta," 1st and 2d.——KOCH, *Description* *des Orobanches de la Flore d'Allemagne*—continued from tom. iv. p. 361, and not completed.——M. LEON DUFOUR, *Notice sur le Sonchus scorzoneræformis, Lag.* (*Sc pumila, Cav.*)—*S. scorzoneræformis* "is a plant peculiar to the Zone of Olives, and delights in warm and dry situations." Found by Dufour on the argillaceous hills of Peralta and Tudela in Southern Navarre; described by Cavanilles from Valentian specimens, and by Lagasca gathered in Murcia. "The most singular feature in the plant, only mentioned by Cavanilles, is presented by the extremities of the divisions of the leaves, whatever the age of the plant, terminating in a subulated point white as snow; this is not occasioned by a peculiar gland or by down, but by a dry and white gangrene; the juices being withdrawn from the extremities, and the fibre alone remaining, deprive it as it were of its green pulp."—"This interesting sonchus presents another remarkable physiological fact. It is endowed with such exquisite irritability of some sub-epidermous glands, that the least pressure of the living plant, and sometimes touch only, causes small globules of milky juice to escape from the angles of the divisions of the leaves, and from the edges of the scales of the involucrum." M. Dufour considers this kind or manner of irritability as yet unnoticed.——C. G. NEES AB ESENBECK et C. MONTAGUE, *Jungermannicarum herbarii Montagneani Species exposuerunt*. The commencement only of a paper descriptive of the Jungermannia in the herbarium of the last mentioned botanist.

American Journal of Sciences and Arts. Conducted by BENJAMIN SILLIMAN, M. D. LL. D. Vol. xxix. No. 2. January 1836. Newhaven. London agent, O. Rich.

I. *Zoology.*

CHARLES FOX, of Durham, p. 291, Notice of some American Birds. A notice of some birds observed during a tour in North America. The author mentions an instance of the young of Molothrus pecoris in the nest of Fringilla socialis, where both species were reared and attended to. Wilson and Audubon mention that this had never taken place.

JUDGE SAMUEL WOODRUFF, p. 304, Notices in Natural History. Two notices, one upon a species of Snake supposed to be Col. sipedon, Linn. which the author found to be viviparous. The second, on what he terms the "Moulting of Snakes."—It extends from the end of May to the end of September, the largest specimens moulting latest. In casting the skin he observed it done in the following manner by one kept in confinement: "After the animal, by pressing the part against the wires, had succeeded in thrusting back the skin three or four inches upon the neck, he left the wires, and throwing his body into a coil round itself, so as to embrace within it the last fold the inverted skin, with a strong muscular pressure, made at the same time a powerful effort, shot his body forward through the coils, which unfolded one after another, and thus drew off the entire skin."

II. *Botany.*

PROFESSOR C. DEWEY, Caricography.—A continuation of the appendix to the above gentleman's paper on the North American carices, p. 245. One plate.

INTELLIGENCE.

ZOOLOGICAL INFORMATION.

Habits of a common Seal (Phoca vitulina) kept in confinement.—The animal, of which the following is a short account, was received in June 1835, having been brought from Scotland to Holyhead in a collier. He had with two others been caught in a fishing net in the north of Scotland, and from the time he began his journey until he arrived at his destination, a period of fourteen days, he had no nourishment whatever except two spoonfuls of milk, he had been forced to swallow; nevertheless, he did not appear to have suffered from his fast. When turned into a small pool surrounded with iron railings, in which some roach and dace had been previously placed, he was highly delighted at his comparative liberty, diving after the fish, which he caught very readily so long as the water remained clear. After catching a fish he did not swallow it immediately, but bit and mumbled it a good deal to break the bones, played with it, and when dead and floating on the surface of the water, would dive, come up under it, and put it under. He appears to have no idea of fear while in the water, but while out of it, and suddenly alarmed, immediately began to scramble towards it. If a dog approached the railings, he would follow it round and round the pool, not, however, venturing out of the water. His time of sleep was always during the day, when he delighted to bask in the sun, sometimes reclining on his back, sometimes on his sides and belly. Towards evening he became very lively, catching his meals, and diving about the pool in all directions. I never knew a fish eaten that he did not catch and kill himself, not even one that was caught and thrown towards him alive, while he was on land. I was sometimes allowed to scratch or tickle him, but if any sudden noise or movement was made, he snapped at the fingers, though he did not continue to hold like an otter or badger.—*T. C. Eyton. February* 11, 1836.

Sitta Europea.—In the "Illustrations of British Ornithology," article Nuthatch, the author, relying upon the authority of Montagu, has stated that this bird is not met with in Cornwall; this he finds from a correspondent is not correct, he having frequently seen and killed it near Liskeard in that county.—P. J. S.

Loxia curvirostra. — Crossbills in great numbers have been very common in various districts of England and Scotland during the last autumn and winter, and, what is worthy of note, many remain with us up to the present date, viz. March 25, 1836.* This is at variance with M. Temminck's account of the bird, and its usual period of nidification, which in his Manual he states to be during the winter months, and whose authority is relied upon, in the Illustrations of British Ornithology. I have just dissected a female, shot yesterday, while feeding upon a larch tree, the seeds of which, divested of their outer skin, filled the œsophagus and crop. The state of the ovary was slightly advanced, some of the eggs having nearly attained the size of a No. 8 shot even. Is it likely that these late flocks will remain and breed in the northern parts of England and Scotland? This is a question of interest, and it is to be hoped that gentlemen possessing extensive pine and fir woods, and who atttend to ornithology, will endeavour to ascertain the fact. The appearance of the crossbill is much more frequent of late years than it used formerly to be, and this I attribute to the extensive plantations made in various directions, all of which contain a large proportion of the larch and other species of fir, the seed of which constitutes the favourite and principal food of this bird. The numerous specimens I have examined this season, have all been of the common species, nor have I heard of any authenticated instance of the *Loxia pytiopsittacus* having been met with.—P. J. S.

---

* May 3d.—A pair were shot at Twizel in the red plumage. The male frequently uttered his love note, and the eggs in the female were larger than peas.—P. J. S.

Macrorampus griseus.—A specimen has been lately procured of this very rare European bird in the vicinity of Carlisle, by T. C. Heysham, Esq. This is the third time it has occurred in Britain. Col. Montague's specimen; one mentioned by Mr Gould killed near Yarmouth; and that now recorded.

Curruca atricapilla and Phœnicura tithys wintering in Britain.—Among the Sylviadæ which occasionally winter in England is the Blackcap Warbler, Curruca atricapilla. This sweet songster, a correspondent informs me, has been a constant visitant in his garden, near Bristol, during the whole of the past winter, even whilst the frost and snow were pretty severe. In the winter of 1834–5, also, the same gentleman, about the end of December, shot a female of this species as it flew across in company with another, and he adds, I have heard the male in full song in some of the coldest days we have had. In Northumberland it is one of our earliest spring visitants, and from my notes I perceive that its arrival has sometimes preceded that of the yellow-willow wren, (Sylvia trochilus). The usual period of arrival is between the 14th and 18th of April. A specimen of Phænicura tithys was shot near the same gentleman's residence in December last, flying in company with the stonechat in some gorse and whin bushes.—P. J. S.

Phycis furcatus—has lastly been taken on the coast of the Solway Firth, near Whitehaven. *T. C. Heysham, March* 1836. "First discovered on the Cornish coast by Mr Couch, occurred also at St Andrews, and seen in the Carlisle market in December 1833 by Mr Heysham."*

Raniceps trifurcatus.—Three species were taken in the Firth of Forth in February last (1836,) by the net which is used in the neighbourhood of Alloa for the capture of sparlings (Osmerus eperlanus.) They are known there to some of the fishermen by the name of *black fish*, and acknowledged to be of rare occurrence.—*R. Parnell.*

Charadrius morinellus, breeding in Cumberland.—In the neighbourhood of

---

* Yarrell, Br. Fishes.

Carlisle, dottrels seldom make their appearance before the middle of May, about which time they are occasionally seen in different localities in flocks, which vary in number from four to fifteen, and almost invariably resort to heaths, barren pastures, fallow ground, &c. in open and exposed situations, where they continue if unmolested from ten days to a fortnight, and then retire to the mountains in the vicinity of the lakes to breed. The most favourite breeding haunts of these birds are always near to or on the summits of the highest mountains, particularly those that are densely covered with the woolly fringe moss (Trichostomum lanuginosum, Hedw.) which, indeed, grows more or less profusely on nearly all the most elevated parts of this alpine district. In these lonely places they constantly reside during the whole of the breeding season, a considerable part of the time enveloped in clouds and almost daily drenched with rain, or the wetting mists, so extremely prevalent in these dreary regions; and there can be little doubt that it is owing, in a great measure, to this peculiar feature in their economy that they have remained so long in obscurity during the period of incubation. After repeated excursions through the lake district for the express purpose in the summer of 1835, of looking for their nests, I was so fortunate as to obtain the eggs in two different localities; namely, three on Whiteside, contiguous to Helvellyn, on the 29th of June, and two on the 5th of July, on Robinson Fell, in the vicinity of Buttermere; the former had been incubated twelve or fourteen days, the latter only recently laid, and in both instances the birds were seen to leave their eggs; one on quitting them, immediately spread out its wings and tail, which were trailed on the ground a short distance, and thus flew away without uttering a single note. On this day (July 5, 1835,) a young bird a few days old was also captured on the same Fell.—*T. C. Heysham.*

Hipparchia blandina.—Very abundant in most of the upland sheep pastures in Dumfries-shire, extending to the lower districts along the smaller valleys, during July and the first week of August; in very great profusion in the head of the vale of Dryfe, and in Eskdale, extending without interruption to the confines of Roxburghshire.

Conops nigra.—Amongst the few Dipterous insects taken in Sutherlandshire, during an excursion to explore the natural productions of that county in the summer of 1834, we find a fine example of the *Conops nigra* of De Geer,—a species which has not hitherto been included in our indigenous lists. It is one of the largest of the genus, measuring about seven lines in length, and is distinguished from the other species by having the abdomen entirely black. The forehead and countenance ferruginous; the thorax wholly black; and the anterior half of the wings deep yellow. The halteres and legs are reddish-yellow, the latter with the base of the thighs black. It is figured and described by De Geer, vol. vi. p. 265, pl. 15, fig. 9. The species to which it is most nearly allied is *C. macrocephala*, Linn. of which Fallen has supposed it to be a variety. This opinion, however, will not be adopted by those who have had an opportunity of examining both insects, the distinctive marks of *C. nigra* obviously exceeding the limits of variation which we are authorized to assign even to very inconstant species. It was first found in Sweden, where it appears to be very rare; and its occurrence in Sutherland is not without interest, as affording another proof, among several others which have been advanced lately, that the insect productions of the northern parts of Scotland become similar to those of corresponding latitudes on the Continent.—For a further account of *C. nigra*, see Herbst *gemeinn. Naturg.* viii. 117, 5, tab. 70, fig. 5.—Meigen, *Europais Zweiflugeligen Insecten*, iv. 126.—*Rev. James Duncan.*

BOTANICAL INFORMATION.

Botanical Society in Edinburgh.—With much pleasure we insert the following notice of the commencement of a Botanical Society in Edinburgh, a district whose Flora is rich, and whose botanists are able. The names of the individuals who have been placed at its head are guarantee for the principles upon which it is proposed to be conducted, and we trust that this institution will ere long assume an important part in the science of Scotland. "We rejoice to observe that a Botanical Society has been established in Edinburgh. At a meeting which was held on the 17th of March, the Society was constituted under the title of the "Botanical Society of Edinburgh." The meetings to be held on the second Thursday of every month from November to July, inclusive.

Professor Graham has been elected President, and Drs Greville and Balfour Vice-Presidents of the Society for the present year.

The advancement of botanical science is the object of the Society. Its operations will for sometime be confined principally to the holding of periodical meetings, to correspondence, to the formation of an Herbarium, and the interchange of specimens. The last is a new feature in the constitution of such a Society, and will be conducted by a Committee, in accordance with certain rules embodied in the laws. The desiderata of botanists in all parts of the Kingdom will be supplied, as far as possible, from the Society's duplicates, and individuals will secure the important advantage of exchanging the botanical productions of their respective districts for those of others more remotely situated. The benefits resulting to science, as well as individuals, by this arrangement, will, it is hoped, be considerable; especially in regard to the Geographical Distribution of Plants in the British Islands, and in the formation of Local Floras. The Society, besides, contemplates an extension of this plan by promoting an exchange of specimens with botanists in other parts of the world.

The members will be divided into the following classes: Resident, Non-Resident, Foreign and Associate. Any person wishing to become a Non-Resident member must be recommended by two individuals belonging to some scientific or literary society, and pay a contribution of two guineas, which without any additional payment, will entitle him, as long as he continues annually to send specimens to the Society, to a participation in the duplicates. To become a Foreign Member, it is necessary to transmit 500 specimens, including at least 100 species, or a botanical work of which the candidate is the author, the former alternative only entitling him to a share of the Society's duplicates. To continue to participate in these duplicates, he must afterwards contribute annually 300 specimens, including at least 50 species.

The Flora of Edinburgh, which is particularly rich, will afford a constant supply of valuable duplicates, and others will be regularly obtained from other parts of Scotland,—especially the rarer Alpine species.

Local Secretaries will be appointed in different parts of the kingdom. In the meantime all communications are to be addressed (postage paid) to the Secretary, W. H. Campbell, Esq. 21, Society, Brown Square, Edinburgh."

Works on British Botany for 1836.—The following works upon the Botany of Great Britain, have either been published since the commencement of the present year, or are in preparation:—The English Flora, vol. v. part 2.—Or the British Flora, vol. ii. part 2. By W. J. Hooker, LL. D. F. R. S., &c. and Rev. M. J. Berkeley, M. A., F. L. S., &c. 8vo, pp. 418. Longman and Co. (The *Fungi* to complete the two works named.) *Published in February last.*—The Flora Metropolitana, or Botanical Rambles within thirty miles of London. By Daniel Cooper, 12mo, pp. 139. S. Highley. *Published in March last.*—A Flora of Nottinghamshire. By W. Howitt, M. D. *Nearly ready.*—The Northern Flora; or, a Description of the Plants of the North and East of Scotland. By Alexander Murray, M. D. *In the press.*—A Flora of Yorkshire. By Mr Baines. *Said to be ready for the press.*—A Flora of Shropshire. By W. A. Leighton, Esq. B. A. *In preparation.*—A catalogue of plants in the environs of Halifax. *Promised by Mr Leyland.*

Jungermannia Woodsii, Hook.—Dr Greville found this beautiful and rare British species in 1833, on Ben Hope, Sutherlandshire. Ireland has previously been its only ascertained British station.—R. K. G.

Carex Buxbaumii, Wahl.—D. Moore, Esq. who has been for some time engaged in examining the botanical productions of the county of Londonderry, for a work which is to form part of "The Statistical Account of the Ordnance Survey of Ireland," has been rewarded by the discovery of many rarities, of which some are quite novel to the Flora of the sister kingdom, and one is altogether new to the British isles, the *Carex Buxbaumii* of Wahlenberg, which was detected on an island in Loch Neagh. The nearest affinity of this plant is with the very scarce *C. tomentosa*; but Mr Moore and Mr Mackay at once correctly distinguished it from that species, by the less downy and larger fruit; the strongly mucronate scales; and above all, the absence of a wholly male spikelet; the base of the upper male spikelet being alone furnished with male flowers. It will rank next to *C. Vahilii*, and indeed, together with it and *C. atrata*, should form a separate section, distinguished by the circumstance above-mentioned, by the upper spike being androgynous; male below, and stigmas three. The character may be thus rendered:—"Carex Buxbaumii; spicis sub 4 sessilibus approximatis oblongis, terminali androgyna, squamis ovato-lanceolatis longe (masculinis brevi) cuspidatis, capsulis ellipticis substipitatis leviter pubescentibus obtusis bicuspidatis, bracteis foliaceis vix caulem superantibus, vaginis nullis."—*C. Buxbaumii, Wahl. Act. Holm.* f. 803, p. 163.—*Fl. Lapp.* p. 244.—*Fl. Dan.* t. 1406.—*Mackay, Fl. Hib. ined.*—*C. polygama, Schkuhr. Cario.* tab. G. g. f. 76. Hab. one of the small islands of Lough Neagh, county Derry, D. Moore, Esq.—*Comp. to Bot. Mag. for May* 1836.

MISCELLANEOUS INFORMATION.

Zoological Garden at Edinburgh.—Proposals for the institution of a Zoological garden in Edinburgh have been issued under the auspices of Sir Thomas Dick Lauder; Professor Jameson; Dr Traill; James Wilson, Esq.; Dr Spittal; Convener Dick; and Dr Neill; and we sincerely wish it success. Shareholders are proposed to have privileges similar to those enjoyed by the members of the gardens of London and Dublin. Various situations are proposed, the Meadows;

on the Grange estate; the Coates estate near Bell's Mills and in the vicinity of the Botanic garden. But in the selection, let every care be taken to choose a dry, airy, but sheltered spot; one low and damp, such as the Meadows, would soon be fatal to all the more tender animals, as has been already experienced in other institutions where a southern climate gave greater advantages.

Histoire Naturelle des iles Canaries.—Five numbers of this work by P. Barker Webb, Esq. and M. Sabin Bertholet, had appeared in April last. It will be composed of 50 numbers, containing a portion of 4to letter-press, and five or six folio plates, and when completed will bind in three volumes. The first will be devoted to the History of the islands; the second to the Zoology; the third to the Botany. The plates, according to the subject, are engraved on copper or stone.

Monograph of the Genus Oliva.—M. Duclos has ready for publication a monograph of the genus *Oliva*. The materials have been collecting for twenty-five years, and the series of shells to trace the variations of form, and marking, and colour is extremely rich. He reduces Lamarck's 67 species to 44, but adds to these 94, describing in all 138 species; what he considers varieties are very extensive, so many as 40 being sometimes ranged under one species. The plates, 35 in number, are folio, beautifully executed, and the four last are devoted exclusively to anatomical details, and to the inhabitants of the shells, drawn from life.—*Rapport de M. Dumeril à l'Acad. de Scien. Jan.* 1836.

Voyage dans L'Amerique Meridionale D'Orbigny.—Eleven numbers of this beautiful and important work have reached us; but the different portions of it appear in a manner so miscellaneous, that it is scarcely possible to give any good notion of it in its present state. Only two plates of the Mammalia, and one devoted to botany have appeared, the Mollusca occupying the greater portion of the Zoological numbers. Of the descriptive part, written in the form of a journal, 312 pages are published, occupying the two first years of the travels, chiefly in Paraguay, and are interesting, though perhaps the composition is not in the most elegant style.

Temminck, Monographies et Recueil de planches coloriées.—The second volume of the "*Monographies de Mammalogie*" is now in the press, and will appear ere long; it is now above eight years since the first volume was completed. The "Recueil de planches coloriées" has now reached its 93d livraison, and it is proposed to complete the first series with the 100th liv., being in all 595 plates, with 755 figures. An arranged catalogue of the pl. Enluminées, and the pl. Coloriées will accompany the last liv., of which a part has already appeared; and on the completion of that series, M. Temminck proposes, if he meets with sufficient encouragement, to commence a second series as a continuation.—Int. to Manuel d'Ornitol. Trois. part.

New general History of Birds.—Mr Gould is preparing a general history of birds, to be published in numbers. The size, royal and imperial 4to, to range with Temminck's Planches coloriées, Wilson's N. A. Ornithology, &c. A figure of a typical form in each genus will be given, and, as far as possible, species which have not been previously represented will be selected. The plates we have seen are lithographic, drawn by Mrs Gould, and beautifully executed.—Crossodeira, N. G.—Microura, N. G.—Paradoxornis, N. G. (See p. 62)—Todus, Sialia, Accentor, will be illustrated in the 1st number.

Dr Ed. Ruppel.—This indefatigable zoologist has commenced a new work entitled "Neue Wirbelthiere zu der fauna von Abyssinien gehörig entdeckt und beschrieben." We have seen the first four fasciculi, one devoted to each branch, Mammalia, Aves, Reptilia, Pisces. The plates are lithographic, the text German, with Latin specific descriptions. Some very interesting species are figured and described.

R. Cunningham, Colonial Botanist New South Wales.—Early in the present year, accounts were brought from New South Wales, which gave the deepest distress to the friends and relatives of Mr R. Cunningham, heightened, if possible, by a kind of uncertainty of their authenticity. Official accounts, however, have now been received, which in part confirm the melancholy fate of this zealous botanist. The following extract will best convey the information, and we would still fondly hope, that, under the guidance of Providence, he may be yet preserved and in time restored to those who now have to lament his absence. "But a grievous misfortune befel the expedition in the loss of Mr Cunningham, the Colonial Botanist, who wandered from the party near the head of the river Bogan, on the 17th of April. After an anxious search, continued for twelve days, during which the party halted, his horse was traced till found dead, having still the saddle on, and the bridle in its mouth. It appeared that Mr Cunningham, after losing his horse, had directed his own steps northward; we traced them into the Bogan, and westward along the bed of that river for twenty miles, and until they disappeared near a recent encampment of natives. There a small portion of the skirt of his coat was found, also some fragments of a map which I had seen in his possession. There were two distinct tribes of natives on the Bogan, but from those with whom we had communication we could learn nothing of his fate. I have ever since indulged a hope that he might have crossed to the Macquarie, and so returned to the settled districts, but this hope has not relieved me much from the most painful apprehensions, considering the dispositions of the natives. Whether Mr Cunningham really survives or not, his absence has made a melancholy blank in our party, and has certainly caused a serious loss to science."—*Athenæum.*

Dr Smith.—We have satisfaction in announcing that Dr Smith, the superintendent of the South African Museum, has returned in safety to the Cape from his expedition to the interior. He arrived in the first week of February, and in general has been successful; but no particulars have yet reached Europe.

NOTICES AND PROCEEDINGS OF SOCIETIES—LONDON.

ENTOMOLOGICAL SOCIETY, April 4th.—Observations and experiments for excluding the house and other flies from apartments, by means of nets, by the Rev. Edward Stanley, M. A.—Descriptions of Zeuxo Westwoodiana, a new crustaceous insect from the Island of the Mauritius by Robert Templeton.—Notes on the habits of Asmia atricapilla, and upon the mode in which its nest is constructed, by G. M. Waterhouse.—Descriptions of six new East Indian Coleoptera, by W. W. Saunders.—Various living bees of different species were exhibited by

Mr Picking attached by the remarkable parasites belonging to the genus Xylops.—*Athenæum.*

May 2.—1. *Entomological Notices*, by W. Spence, Esq., F.R.S., including "Observations upon, and suggestions for obviating the great annual expenditure caused in Brussels by the attacks of some of the timber-boring Beetles in the wood-work of houses;" also, "Observations upon the injury caused by the Scolytus destructor to the Elm-trees in the Park at Brussels;" also, "Upon a disease to which Silk-worms are subject in Italy, termed the Muscadine, and which is proved to be caused by the growth, within and upon the bodies of these caterpillars, of a minute parasitic fungus," thus affording, as the Rev. Edward Stanley noticed, an analogy and a clue to a solution of the difficulties connected with the nature of the vegetable wasp of Surinam. 2. "Descriptions of a new genus, and several new species belonging to the Coleopterous family Paussidæ, from the collection of M. H. Gory of Paris," by J. O. Westwood, F.L.S. Secretary of the Society. 3. "Extracts (relating to the *Annulosa*) from a memoir upon the comparative development of the nervous system of the various classes of animals with that of the human subject, illustrated by a beautiful series of preparations and drawings," by John Anderson, Esq., of Richmond. 4. "Notices of the destruction of the Canes in the West Indies by the Mole Cricket," communicated by J. C. Johnstone, Esq., M.E.S. of Grenada, and which, upon the motion of Col. Sykes, was referred to the Cane-fly Committee of the Entomological Society.—*Athenæum.*

Medico-Botanical Society, 8th March 1836.—Earl Stanhope, President, in the chair; Dr M'Reight was elected a Fellow of the Society.—Dr Morries, F. R. S. Edinburgh, and Professor of Toxicology to the society, made some observations on opium, conium, digitalis, tobacco, and hyoscyamus, more especially with reference to their empyreumatic oils. There appears to be considerable resemblance between the oils of these plants: they are obtained by distillation from the dried powdered leaves. A specimen of the oil of hyoscyamus was exhibited, which presented the following characters: It has a light yellow colour, and an oily appearance; a very powerful, virose odour, so penetrating and volatile, as to be perceptible at a considerable distance, even when the bottle is closed. Eight or nine drops, Dr Morries stated, would destroy life in an hour and a-half, and he observed that it was nearly as fatal as prussic acid: a much more powerful preparation, however, might be obtained, by distilling this empyreumatic oil with potass; the same quantity of the products would cause death in from thirty seconds to two minutes.—*Communicated by Mr Foote.*

Edinburgh.

Royal Society, January 18, 1836.—Right Honourable Lord Greenock, V. P. in the chair. Observations and experiments on the coloured and uncolourable matters in the leaves and flowers of plants, particularly in reference to the principles upon which acids and alkalies act in producing red or yellow or green colours, by Dr Hope.

March 7th, Sir T. Mackdougall Brisbane, President, in the chair.—Communications were read by Dr Christison and Dr Graham, on the composition and the botanical origin of Gamboge.

Wernerian Society, January 9, 1836.—Professor Traill, V. P. in the Chair.

Mr James Wilson read a paper on the birds included under the Genus Eurylaimus of Horsfield, illustrating his remarks by species and figures.

Sir Patrick Walker read a notice regarding the occurrence of Motacilla neglecta, Gould, on the banks of the Water of Leith,* and of Ardea minuta being killed at the mouth of the Tyne in East Lothian.

February 6th, R. Stevenson, Esq. in the Chair.—Professor Jameson exhibited a series of birds collected by Captain Clunie, among which were species of Sula alba from Moreton bay.

A species of Pernis from India was exhibited and characterized as new under the title of P. Elliotii, the donator of the species to the Museum.

Two buzzards, said to be killed in Britain, one near Birmingham, the other near Newcastle, were exhibited. The particulars of their capture were to be ascertained.†

In May 1834, a series of premiums were proposed by the Wernerian Society, —"The best geological account of the three Lothians, with map, sections, and specimens, to be given in December 1835, Twenty Sovereigns.——The best Natural and Economical History of the Fishes, marine, fluviatile, and lacustrine of the river district of the Firth of Forth, with collection of specimens, to be given in December 1835, Ten Sovereigns.——The best account of the Entomology of the three Lothians, with collection, and map of distribution of the insects, to be given in December 1836, Ten Sovereigns.——Best Essay on the Botany of the Mountains of Scotland, in connection with their geological structure and composition, specimens and map of distribution of plants, to be given in December 1837, Ten Sovereigns.——Best account of all the Avertebrate animals, (with the exception of Insects and their larvæ) inhabiting rivers and Firth of Forth, their tributary streams and lakes, with collection of specimens, to be given in December 1837, Ten Sovereigns." One essay on the *Ichthyology of the Firth of Forth* has been sent in, accompanied by numerous specimens, and one on the *Geology of the three Lothians*, accompanied by a map and specimens.

PROVINCIAL.

CARLISLE LITERARY AND PHILOSOPHICAL SOCIETY,—instituted in the commencement of 1832. Earl of Lonsdale, Patron. Richard Ferguson, Esq. High Sheriff of the county of Cumberland, president for the year 1836. Have commenced a library and museum for the reception of Zoological and Mineralogical specimens—for objects of art and antiquities—and a collection of philosophical instruments. Twelve papers were read by members during 1835—chiefly on mineralogy and meteorology; on 7th December by Mr Pears a paper on "Botany and Vegetable Physiology."

The subscription annually for ordinary members is one guinea, with a like sum for entry money. Ladies are admitted as subscribers at half-price without the entrance charge, and have a right to admission to the lectures and privileges of the museum. The meetings of the society are held on the first Monday of each month at seven in evening. The first annual report is published, Hudson Scot Office, Carlisle, 1836, pp. 23.

---

* We trust that specimens will be secured during the summer. This is the second time that M. neglecta has been recorded occurring near Edinburgh; but the birds seem always to have been neglected, and at this time we are not sure that there is a specimen in town.

† We saw the skins, and at the time expressed our doubt of their being killed in this country, from the manner in which they were prepared. The one is an African, the other an Indian species.

OBITUARY.

"The Rev. JOHN TOZER, late Curate of St Petrock, Exeter; where he was much respected. His body was found drowned near Shrewsbury, and not recognized by any one in the neighbourhood; but, the circumstance being made known by a newspaper sent accidentally to Teignmouth, the description caused strong suspicion of its referring to Mr T.; and a relation went off immediately, who examined many articles of his dress, and collected so much information as to leave not the slightest doubt of his identity. The body, it is supposed, had lain several weeks in the water." *Gent. Mag. April* 1836, p. 438.—Mr Tozer, whose melancholy fate is here recorded, was well known to British botanists, for he is repeatedly quoted in the *British Flora* of Hooker, and, in the *Flora Devoniensis*, as an authority for habitats of some of our rarest plants. He was the discoverer of the first British station of *Erica ciliaris*, and of the *Bryum Tozeri*, so beautifully figured in the *Scottish Cryptogamic Flora* of Dr Greville, vol. v. pl. 285. "I rejoice," says Dr Greville, "in being able to bestow upon it the name of my indefatigable friend, who is also known to have distinguished himself by finding *Schistostega pennata*, after it had apparently disappeared for many years."

January 1. 1836. "At Shropham villa, Norfolk, aged 33, (an evident misprint, he was in his 58th year. See *Mag. Nat. Hist.* ix. p. 164.) The Rev. *George Reading Leathes*, Rector of Limpenhoe with Southwood, and of Wickhampsted, Norfolk. He was of Jesus College, Cambridge, where he graduated B. A. 1801, M. A. 1813, was presented to both his livings in 1803 and in 1804. by J. F. Leathes, Esq. He was attacked on Christmas day by a fit of apoplexy, whilst in the reading desk, and lingered for one week, until the following Friday. He was well known as a naturalist, a horticulturist, and a general patron of the fine arts." *Gent. Mag. April* 1836, p. 439. His name is commemorated in the *Ovula Leathsii* of Sowerby, of which he was the discoverer.

The Baron de Férussac.—We are sorry to announce the death of the indefatigable Baron de Férussac, the founder and editor of the *Bulletin Universel*. He had long suffered from an affection of the lungs, but did not quit his labours till just before his death. Among other excellent works, his natural history of the Mollusca was one of the first, and is illustrated by the best plates published in France; his monograph of the *Cephalopoda* is equally beautiful, but neither of these undertakings is finished. He was always anxious to forward the views of those connected with science, and was particularly obliging to foreigners. He was in his fifty-second year.—*Athenæum*, 2d April 1836. (In an early number we shall give an account of the works of this excellent molluscologist.)

PRINTED BY JOHN STARK, OLD ASSEMBLY CLOSE, EDINBURGH.

MAGAZINE

OF

ZOOLOGY AND BOTANY.

ORIGINAL COMMUNICATIONS.

I.—*On the requisites necessary for the advance of Botany.* By the Rev. J. S. Henslow, M. A., Professor of Botany in the University of Cambridge.

That we are, as a nation, behind our continental neighbours in almost every branch of scientific research, is an assertion which has often been made of late; and has been more formally pronounced in several of the reports which have been read within the last three years at the anniversary meetings of the British Association. That this censure may be extended to botany, is rendered probable by the fact, that we have had no journal devoted to this science, and conducted on strictly scientific principles, which has ever met with sufficient encouragement to allow of its being carried on for several years together. But, in admitting the fact of the inferiority of our scientific character, as a nation, we must still venture to assert the claim of Great Britain to the possession of some botanists whose attainments and reputations are on a par with those of the highest enjoyed by their continental brethren. But in speaking of our national inferiority we do not allude to the attainments of a few; and the want of encouragement which such periodicals as the Annals of Botany formerly, and the Botanical Miscellany, and Journal of Botany, more recently, have met with, clearly prove the low ebb at which botany as a science stands among us. It is true that the two last mentioned periodicals are still continued under the title of a "Companion to the Botanical Magazine," but this very fact confirms our assertion. It may perhaps be thought that we make no slight pretensions to the character of a botanical nation, whilst such publications as the Botanical Magazine and Botanical Register have so long received encouragement and support; the first of which has now been regularly published for a series of more than forty years. The circumstance of these works being edited by two of our most eminent botanists speaks at once to the importance of their contents, and is an ample guarantee of their being replete with the best and most strictly scientific details. But it will scarcely be denied, that excellent as these publications undoubtedly are, their chief and really efficient support is derived from their horticultural rather than from the botanical portion of their subscribers. Hence it happens that they must each, to a certain extent, sacrifice the character of strictly scientific publications to suit the taste of their horticultural readers. We do not affect to complain of this, we are merely stating the fact as illustrative of our assertion. The Magazine of Natural History, published by Mr Loudon, and which has done much towards spreading a taste for natural history generally, can scarcely be considered an exception; for though it undoubtedly contains several valuable and truly scientific memoirs, yet by far the greater portion of its pages do not bear this character, nor can it in this respect be compared with such foreign journals as the "Annales des Sciences Naturelles," the "Allgemeine Botanische Zeitung," &c. In England, we find our leading naturalists generally prefer sending their more important communications to some public scientific society, in whose transactions they may appear to greater advantage than in the pages of a magazine. Still, it must be allowed that a regular periodical affords far greater facilities for the immediate dissemination of discovery in science than the transactions of any society,—such a periodical may further be made especially useful in stimulating to exertion those persons, and they form a numerous class among us, who are content with loitering about the threshold of science, and merely amusing themselves with the results attained by others. Could they be persuaded to engage in some branch of original research they would much increase their means of enjoyment, and at the same time be adding to the general stock of human knowledge. Among all nations we assuredly possess the means of accomplishing more for botany than any other; and we should easily take precedence of all others in this science, if we could persuade those who content themselves with skimming the surface to plunge a little deeper. In what other country do we find so many engaged in horticultural and floricultural pursuits. There is scarcely a town of any note without its horticultural society, and many now possess their botanical and horticultural gardens. But if such great interest is felt in the mere cultivation of fine flowers and handsome fruit; if the mere gratification of the eye or of the palate can stimulate so many to the laudable exertions which are made in support of these societies, with their costly medals, and numerous prizes and extra prizes, how much deeper interest would they feel if they would once consent to add somewhat of a more intellectual character to their scheme, and contrive to occupy their thoughts with the engaging pursuits of scientific botany, or attempt a few of those important experiments which might be turned to account in establishing the leading principles of vegetable physiology. To those who have never paid any attention to speculations of this kind, but have been hitherto satisfied with merely admiring the forms and colours of the splendidly beautiful flowers which result from high culture and successful art, there often appears a degree of mystery or difficulty hanging over such researches which deters them from attempting anything partaking of a really scientific character. It is undoubtedly true that something like an intellectual exertion is required to master the first principles of this science, and to become acquainted with the technical nomenclature necessarily established for the purpose of facilitating our advance. But what is this when compared with the higher stretch of thought requisite to master the rudiments of abstract science. To obtain a knowledge of a science of observation, like botany, we need make very little more exertion at first than is required for adapting a chosen set of terms to certain appearances of which the eye takes cognizance, and when this has been attained, all the rest is very much like reading a book after we have learnt to spell, where every line and every page affords a fresh fund of intellectual enjoyment. It is on these grounds that we would particularly recommend every horticulturist or other person any way occupied in the cultivation of plants, to increase his stock of intellectual enjoyment by conducting his pursuits in connection with scientific inquiry.

Great advances have been made within the last half century in various departments of this science, in the classification of plants upon sounder principles than those which had so long been predominant; in obtaining more accurate details of their anatomical structure, owing to the greatly improved condition of the microscope; in the more perfect analyses which organic chemistry has furnished of the immensely numerous products of vegetation; and lastly, in certain generalities relating to the geographic distribution of plants. But still we are very far removed from perfection, either as relates to the discovery of that natural system upon which the great Author of Nature has planned the works of creation, or as regards the detection of those laws by which the several functions of vitality are regulated. In all probability, there is ample scope for the accumulated observations of many generations yet to come, before we can expect that either systematic botany or vegetable physiology will take up their position by the side of the exact sciences. In the present state of our knowledge, there is perhaps most to be expected, towards making some decided step in advance, from those botanists who have it in their power to attend to the cultivation of plants in all its practical details. So far as any thing can be expected from direct observation on the structure of individual specimens, there are plenty of willing workmen of the most able class both at home and abroad, but there is a decided want of scientific experimenters, and until further information can be obtained from the positive results of experiment, we may scarcely hope to establish on a very firm basis, any of the more important principles of the science. Notwithstanding that every classification of plants proceeds upon the predetermination of the specific characters of individuals, hundreds of examples might be produced in proof of the real ignorance of our very first rate botanists, as to the limits within which a species may vary. In some cases they are tolerably agreed about arranging as a single species numerous forms possessing a marked dissimilarity; and here they have been guided either by the results of experiment, or they have had the opportunity of seeing so many intermediate forms between two of the most marked varieties, as to leave no doubt that all were referable to a common origin. There are, however, a multitude of instances where the resemblance which two individuals, of somewhat different form, in certain respects, is decidedly striking, and which are nevertheless almost universally considered to belong to different species. There is, in short, no law whatever hitherto established, by which the limits of variation to a given species can be satisfactorily assigned, and until some such law be discovered, we cannot expect precision in the details of systematic botany. In this respect the science is pretty much in the position which mineralogy occupied before the discovery of the laws of crystallography; mineralogists were frequently in the dark as to what crystals were to be included under one species, and they knew almost nothing of the numerous forms in which any given species might occur, until they were actually found to exist. But now, a single crystal at once puts the mineralogist in possession of the primitive form of the species, and he can calculate " à priori" the possible forms under which it may occur. Perhaps we may be allowed to suspect some analogy between the primitive forms of crystals, and those normal or typical forms which may be assigned to different species of plants, by the application of such rules of morphology as already appear to a certain extent satisfactorily established, viz. the partial suppression or complete abortion of particular organs, and the adhesion of others. Although no precise laws have hitherto been discovered in botany, which assign the limits of variation to a given species, some approximation to them might possibly be expected, by attending more strictly than seems to have been customary to the principles of analogical reasoning. Thus, when we find the admitted varieties of one species ranging through certain peculiarities of structure, it is reasonable to suppose, that if we now find two other individuals of the same genus, which do not differ more, or so much from each other as the former two, then these ought also to be considered as varieties of a single species. In the determination of species, our most eminent botanists seem frequently to be acting against their own judgment, and compelled to describe as distinct what they have little or no doubt themselves, ought to be considered as identical. Hence they are perpetually qualifying their descriptions with such phrases as these, "Priori nimis affinis,"—"vix et ne vix distincta,"—and even after this a third species is still described as "duabus prioribus exacte intermedia!" It is perhaps extremely difficult to form any dècided opinion about the limitation of species, and we find some persons who, instead of wishing to multiply them beyond their due limits, are inclined to run to the opposite extreme, and believe that there is no such thing as distinct species at all; a clear proof again that we are in want of multiplied experiments, undertaken by careful and scientific observers. But we shall never make any progress towards solving the problem, if we continue dissatisfied with the positive results of experiments, merely because they happen to militate against our preconceived notions; and though a proper degree of caution ought always most unquestionably to be exercised, before we admit even the most positive evidence in favour of a new and startling fact, yet there can be very little value assigned to any mere assertions which may be made contradictory of such a fact, even though they should be partially supported by the negative results of direct experiment. Although several years have passed since Mr Herbert proved by experiment that numerous varieties of Primrose, Cowslip, Oxlip, and Polyanthus, might originate from the seeds of a single plant, agreeably to the opinion of Linnæus, who considered them all to be mere varieties of the same species,—and although the fact was partially confirmed in a notice in the Magazine of Natural History some time ago, our systematic botanists are not yet convinced of the truth of these results, though it does not appear that they have weakened their authority by any appeal to experiment, the only test which can here be considered admissible. Although it has been shown experimentally, that plants of Anagallis arvensis can be raised from seeds of Anagallis cœrulea, agreeably to the opinion of De Candolle in the Botanicon Gallicum, who considers them mere varieties of the same species, and although nothing satisfactory has been brought forward contradictory of this opinion, the more general feeling appears still to be adverse to their being included under one species. These remarks are not made with the view of inducing those who are sceptical as to the accuracy of these experiments, to change their opinion, but if possible to persuade them to repeat the experiments and record the results. Other cases might be mentioned where similar experiments have lately been prosecuted on the Continent, and the results obtained have justified the propriety of a reduction of species; but they have not as yet been conducted on a scale sufficient to warrant any hope of our deducing a general law from them. For the present then, and until some such law is established, we must remain content with limiting our species by those empirical rules which multiplied observation alone affords us, and from the examination of every variety that we can lay our hands upon. In their restriction of species, different botanists are influenced by very opposite considerations.—Some prefer multiplying their number to the utmost extent, whilst others, and these form the less numerous class, would reduce nearly all doubtful cases to the rank of varieties. To the opinions of the latter class we are most decidedly favourable, and it is with great satisfaction that we find the following remarks upon this subject in the preface to the excellent Flora of the Indian Peninsula, by Dr Wight and Mr Arnott,* "We shall perhaps be severely censured for cutting down species. We have all along considered it as trifling with nature to separate species on slight or variable grounds, nor could we ever understand the 'cui bono' for which so much ingenuity in splitting hairs has been wasted. Before we determined what was a species, we examined with care numerous specimens from the same and different localities; and so far we have had an advantage over many other of the European botanists who have described Indian plants, they having only seen one or two isolated specimens. Numerous observations, too, were made on the plants in their natural situation, the result of which went to prove, what we have frequently endeavoured to enforce by examples throughout the present volume, that no precise shape of leaf or quantity of pubescence is of any value, although both of these seem in each species to be limited within certain variations. With regard to varieties, we have seldom distinguished any, unless well marked and tolerably constant; we are aware, indeed, that these correspond to what some naturalists call species, but our own observations have convinced us, that varieties and forms, as well as species, may be constant in similar situations, and even in widely different situations, for many years, if raised from seeds either obtained from the original locality or from cultivated plants; the cultivated cerealia and garden vegetables ought to lead to such an hypothesis without any additional proof."

---

* P. 21.

The extent to which uncertainty prevails on this question, cannot be better shewn than by the remarks of Dr Lindley, in the new edition of his Synopsis of the British Flora.* Here we find this distinguished botanist, who has devoted so much attention to the two genera Rosa and Rubus, confessing himself incapable of deciding whether certain forms in the latter genus constitute one, three, or fourteen species. " When I first began to attend to this very difficult subject, I could not avoid remarking that the same distinctions and peculiarities which had led to the establishment of many of these (species), would also separate many other forms of the genus; and it appeared to me that, to be consistent, we ought either to reduce the whole to *Rubus suberectus, fruticosus, corylifolius,* and *cæsius,* or to distinguish a considerable additional number of such species as Smith, by the advice of his correspondents who had specially occupied themselves with the subject of British plants, had been induced to admit."—" I accordingly advanced the number to twenty-three; certainly not from any expectation that such species were either genuine, or likely to prove permanent, but with a view of following out the *recognized* principles of distinction, and showing whither they must inevitably lead."—" It has led me to reconsider the subject very carefully, and to examine with more attention the nature of the principles upon which the modern and *recognized* species of Rubus have been established; I have also had six years of additional experience; and I am bound to declare, that I can come to no other conclusion than that with which I have first started, namely, that we have to choose between considering the four first named plants the only genuine British species, or adopting, in a great measure, the characters of the learned German botanists, (Weihe and Nees von Esenbeck,) who have so much distinguished themselves in the elaboration of the genus. So clear is my opinion upon this point, that, if it had been possible to prove the four species to which I have alluded to be themselves physiologically distinct, I should at once have reduced all the others to their original places; but as it is in the highest degree uncertain whether *R. fruticosus, corylifolius* and *cæsius* are not as much varieties of each other, as those which it would be necessary to reject, I have thought it better to steer a middle course, until some *proof* shall have been obtained either one way or the other. Accordingly, I have taken *R. fruticosus, corylifolius, cæsius* and *suberectus* as heads of sections, and I have assigned them characters which may be considered either as sectional or specific, according as the evidence may ultimately preponderate; and I have arranged as species under them those forms which are the best marked and the most clearly distinguishable. This will bring the genus *Rubus* somewhat into the situation of *Rosa;* in which, I fear, we must be satisfied with leaving it for the present."

---

* P. 91.

We have dwelt somewhat longer upon this topic than to many may seem advisable, but we feel so thoroughly persuaded of the very great importance of some exertions being made for the purpose of obtaining a better criterion for the descrimination of species than the mere empirical rules at present practised, that we trust to be excused for attempting to direct the attention of all those who have it in their power to follow up the subject experimentally, to this very desirable object.

Although we must not hope to attain that degree of perfection in systematic botany, which would probably be the immediate result of our detecting the laws which regulate the limitation of species; yet much has been, and much more may unquestionably be achieved, through the means actually in our power, towards distributing plants into natural groups, and pointing out the relations which such groups bear to each other. Nothing has of late years contributed so much to the progress of systematic botany, as the publication of separate monographs of genera, tribes, and orders by different individuals. The number of species already known is so great, that no single botanist can ever hope to examine in minute detail more than a small fraction of them. He may, however, become thoroughly acquainted with the leading characteristics of every order, and of their subordinate groups, and many of their genera, by merely examining for himself a portion of the species which they each include. But if, in addition to his general studies, he also directs his attention more especially to some particular group, for the purpose of completely elaborating the minutest details in the history of every species it contains, he cannot fail of making some observations which may assist in approximating more closely to the discovery of the natural system. Independently of any formal attempt of this kind, every one who examines for himself is continually stumbling upon something or other, which, if it were recorded, would assist in refining our systematic arrangements; and such minor observations may always find an appropriate place in the pages of a scientific magazine, when they might be considered too trifling for publication in the Transactions of any scientific society.

The greatest desideratum in scientific botany next to obtaining a law for the determination of species, is some criterion for establishing the relative values of those different groups into which species are collected, under the titles of Genera, Tribes, Orders, &c., compared with some of the best defined and most extensive natural groups, such as the Compositæ, Leguminosæ, Gramineæ, &c. There are many others, considered as Natural Orders, which seem to possess very slight claims to be ranked with them as groups of equal value. The tendency at present appears to be more generally in favour of subdividing those which have been previously established, than of connecting such as are most nearly allied. In the excellent publication of Nees ab Esenbeck, the " Genera Plantarum Floræ Germanicæ," this principle is carried to an extreme, and so far as it serves to point out the distinct groups, however numerous, into which species may be collected, nothing can be better. The next requisite is to know how to distribute these minor groups into larger ones, which the author has also effected with great judgment. But still in the present state of the science, we have no certain knowledge whether the several groups bearing the same name are truly of the same value. The difficulty which at present attends the construction of natural groups of similar value is forcibly exhibited by Mr Bentham in his excellent and elaborate monograph on the Order Labiatæ. Under his genus Melissa, in which he includes Calamintha, Acinos, and Clinopodium of other authors, he observes,* " Whether the characters be derived from the parts of fructification or from general habit, the circumscription of this and the nearly related genera of Hedeoma, Micromeria, Gardoquia, and Keithia, is attended with much difficulty; and it might, perhaps, have been a clearer classification, if the whole had been considered as forming one extensive genus, as in the case of Salvia, Hyptis, Teucrium, &c. The relative proportion, direction, and size of the upper and lower teeth of the calyx, the hairs at the orifice, the proportion of the corolla to the calyx, the fertility or sterility of the upper stamina, the relative situation of the two lobes of the anthers, the form of the extremity of the style, and even the general direction of the stamina—characters which, in the rest of the tribe, are more or less constant—are remarkably uncertain in the present series, and seldom correspond with the differences of habit and infloreseence. These differences, on the other hand, are too vague and difficult of definition to be available for the purpose of generic distinctions. Whilst, therefore, I have endeavoured, as in other instances, to take the organs of fructification as the bases of generic, and the inflorescence and habit of sectional characters, I am fully aware that there are many species which may be nearly as well placed in either of two or more sections or genera; but every day brings further proof of the impossibility of reducing nature to any thing like mathematical accuracy."

---

* P. 384.

To pass from the requisites necessary to secure the advance of scientific botany, to those which may be considered essential to the progress of botanical physiology, we have a wider field open, and to a much more numerous class of observers, than the one we have already discussed. This part of our subject is in its first infancy, and it is in the power of any one without much difficulty, to make himself master of the details necessary to place him in possession of the leading facts hitherto ascertained, and of the nature of those difficulties which impede the progress of this department of botany, and all this may be attained without the necessity of his being previously forced to master the details of systematic botany. It is here that recourse to experiment is of paramount consideration. Although some knowledge of vegetable anatomy may be requisite, much may be done in researches of this kind without any minute acquaintance with the details of the internal structure of plants, or the necessity of attaining to any great degree of skill in the use of the microscope. Vegetable anatomy is itself comparatively far behind that of animals, and there are many points of primary importance still under dispute. Notwithstanding the many discoveries which have been made by the great skill of our modern miscroscopic observers, very little is known of the comparative anatomy of different genera, and indeed little more of the internal structure of plants, generally, than the forms and appearances presented by the several elementary organs of which the vegetable tissues are composed. We have accurate delineations of a great variety of the vesicles in the cellular tissue, of the ducts and tracheæ composing the vascular, &c., but very little information has hitherto been obtained as to the precise offices which these several organs are destined to execute. A great multitude of dissimilar products are elaborated and secreted by some one or other of these organs, but we know little or nothing concerning which of them it is that produces each separate result. Even the manner in which the imbibed nutriment is conveyed from the root to the leaf is not satisfactorily determined—the functions of the leaf itself are not so well established as to be placed beyond all doubt; or rather, the manner in which these functions are performed is not yet well understood. The researches of Robert Brown and Ad. Brogniart have settled, beyond dispute, some of the most important preliminary phenomena attending the fertilization of the ovule, but the ultimate facts are still to be discovered, and at present we have only conjectures and opposite hypotheses between which we are to choose when we would inquire how the embryo may have originated, after the pollenic tubes have penetrated down the style into the ovarium. It seems indeed to be *all but* proved that these tubes really attach themselves to the foramen, a circumstance which would appear to favour the somewhat mechanical theory of the introduction of the pollenic granules themselves into the nucleus. Hitherto, the fact of a general circulation of the proper juices, or latex, in plants, through a peculiar system of anastomosing vessels, has only engaged the attention, or even met the observation of very few persons, except the original discoverer. The mode in which the assimilation of new materials takes place during the development of the trunks of trees cannot be considered as satisfactorily determined; the most favoured theory on the subject (that of Du Petit Thouars) requiring the confirmation of direct experiment, as well as the removal of very serious objections.

But besides such inquiries as these, which need great delicacy of manipulation and considerable experience in the use of the microscope, there are many others which are within the reach of every one —like that question, so important in agriculture, lately started by De Candolle, whether the excretions from the roots do not deteriorate the soil, as respects other plants of the same or allied species, but actually improve its qualities for those of different families. The agriculturist who wishes to prosecute this, or any research of interest in a physiological point of view, must remember the sound advice which De Candolle has given—always to perform a series of comparative experiments, by which means alone he can hope to check that liability to error, against which the most accurate judgment is no safeguard, whilst it relies only upon its natural unassisted powers.

In thus briefly noticing some of the more important topics which might advantageously engage the attention of those who wish to promote the progress of botany, beyond the stage at which it is now arrived, we are by no means inclined to undervalue the labours of those who content themselves with merely reviewing the steps through which it has already advanced, and may not be disposed to travel out of the beaten track. Even those who confine their attention to the local botany of some well known district, have it in their power to improve our knowledge of individual species, and teach us something more than may be already known of their distribution and properties. Notwithstanding the perfection to which the knowledge of the native plants of England has arrived, there is unquestionably much that is yet to be done before we can expect to obtain a precise account of our indigenous Flora. Not to mention those parts of Ireland which hitherto have never, or scarcely ever, been trodden by the foot of a botanist, the mountains of Scotland are still producing fresh novelties to reward the ardour of those who accompany our Northern Professors in their annual excursions. Although we cannot expect very numerous additions to be hereafter made to our phanerogamic botany, there must still remain many species unnoticed among the lower tribes of Cryptogamia, especially among the obscure families of Fungi. Now indeed that we possess a complete Flora of Great Britain, since the recent publication of the second part of the fifth volume of the English Flora, from the accurate pen of Mr Berkeley, we may expect daily additions to be made to our knowledge of the Fungi, from various parts of the country, so soon as they shall have been more carefully searched under the direction of this new guide. But it is not so much the discovery of new species which is likely to make us more thoroughly acquainted with the real character of our Flora, as the determination of the precise circumstances under which the old ones occur. No one can deny that our strictly indigenous Flora has been greatly augmented by the importation of many exotic species, which have become more or less perfectly naturalized, and must now necessarily be considered as forming part of the wild and native vegetation of the country. It is, then, of first rate importance to the progress of Botanical Geography that we should determine, as nearly as possible, which are the truly indigenous and which the naturalized species.—Formerly, indeed, and perhaps the time is not quite gone by, British botanists were proud of swelling the local Floras of a given district by the addition of any chance specimen which they happened to meet with, and thought very little of stating the circumstances under which a little reflection or inquiry might have satisfied them, it was most probably brought within the sphere of their notice. Sounder views of the requirements of science ought to satisfy us, that he who can show good reason for expunging a plant from the list of our strictly indigenous species, does some real service towards the attainment of truth, whilst he who needlessly swells his catalogue by the admission of a species on doubtful authority, throws a decided obstacle in its way, and surely doubly puerile is that vanity, by which some are said to have been influenced, who have one year sown the seeds of a rare, or even of an exotic species, in an unfrequented spot, that they might become the earliest discoverers of a *new native!* There is enough in all conscience to puzzle us in our search after truth, without the problem being thus complicated by the intentional introduction of error. For the purpose of comparing their own observations of the geographical range and distribution of our native species with what is already known on these subjects, our local botanists may consult the recent treatises of Mr Watson with the greatest advantage. Attention to these and other like points of general interest will add a very considerable charm to the attractions which the study of botany possesses, even to him who is content with merely collecting and arranging his specimens. For we find it too often happens with those who are merely plant collectors, that the pleasure which they at first experienced, when every species was new to them, and afforded a fresh subject for admiration, and every rare specimen brought with it a still greater delight in the acquisition, that they sooner or later became wearied of the pursuit. When they no longer find new or rare plants to rouse their attention, they give up the study altogether, or attempt to make no further progress in it. But this would never happen, if they would only chalk out for themselves some line of original research, upon which they might more especially fix their attention and make it their primary object to be continually searching for facts which bore upon it.

II.—*Observations on the Digestive Organs of Birds.* By WILLIAM MACGILLIVRAY, A. M., F. R. S. E., M. W. S. Conservator of the Museum of the Royal College of Surgeons of Edinburgh.

THE alimentary canal of birds not having been subjected to that kind of investigation which might lead to important zoological results, I have recently directed my attention to it, with the view of comparing its modifications of structure and form. It has seemed to me to be entitled to very special consideration, both on account of its importance in the animal economy, and because of the advantage which might be derived from it in constructing an arrangement of the families, genera and species of a class of beings, which, however well defined in itself, has not yet been satisfactorily subdivided.

Various organs have, in some aspect or other, been brought forward as necessary to be considered in arranging birds; but to almost all systematic writers the bill and feet have supplied the characters by means of which the species have been disposed into groups. These organs, however, have by no means afforded unexceptionable marks of distinction; and even the more comprehensive sections of systems have, by employing them exclusively, been so vaguely defined, that the characters given do not in general apply to half the species which they are meant to include.

Thus, although many writers agree that there should be an order or great division, to which the names of Passeres or Insessores might be given, and composed of forms, such as the hornbill, the humming-bird, the thrush, the grossbeak and the kingsfisher, between which one, not at first sight only, but after long study, might fail to discover any great similarity, none has offered any general description of it less free of absurdity than the following by Mr Jenyns;—"Bill various; legs short, or of moderate length: feet adapted for perching: toes four, varying in position, flat underneath; hind toe articulated on the same plane with the fore toes: claws slender, somewhat retractile, curved and acute." Now, if with reference to so vast a number of species, nothing more precise can be said of the bill than that it is "various," either the bill is not capable of furnishing a character, or the group of Passeres or Insessores is most unnatural and heterogeneous. If the legs are "short or of moderate length," it might as well be said at once that they are not long. The feet are not better "adapted for perching" than those of the vulturine, falconine and strigine species; and many birds even among the Grallæ and Palmipedes perch as expertly, and on their perches stand as securely as most Passeres. The articulation of the hind toe is not peculiar to the Insessores, nor are their toes by any means so flat underneath as those of many other birds, the pigeons for example, the curlews, plovers, and geese. If the claws are generally "slender, curved, acute," so are they in the sparrow-hawk, the stormy petrel, and many other birds. Surely then, it is time to look for other characters than such as any one, unblinded by custom and creed, may at once perceive to be utterly inadequate. The removal of old errors is not less useful to science than the disclosures of new truths.

The nervous system of birds seems to me incapable of furnishing distinctive characters, because its parts are so similar in the different groups that, although they differ in each from any given standard, their differences cannot be intelligibly described. The same may be said of the vascular system, the respiratory, which, however, presents many tangible differences, and the generative, which has received little comparative examination. The organs of sense afford many good characters, especially the tongue, which, however, is more to be considered as an organ of prehension than of gustation; but they are too little diversified to form a basis of classification. The osseous and muscular systems, however, taken together, might afford a suitable basis; but their characters would be more applicable were they taken in connection with the digestive, to which they might be viewed as subservient. An alimentary canal is common to all classes of animals, and is in all more easily examined than any other apparatus, excepting the dermal; and as the nature of the digestive organs determines the more characteristic habits and actions of birds and other animals, they are obviously entitled to the highest consideration.

In Birds the digestive apparatus may, by superficial observers, be considered as very simple; yet it is certainly as complex as in the Mammalia; and as it presents modifications numerous and definable, easily observed and readily applied, it seems to me that, considered in all its parts, and taken as a centre of relations with respect to the other organs, it is better adapted for affording ordinal, family, and even generic characters, than any other.

Were I therefore to propose a new arrangement of birds, I should base it on the digestive organs, or the intestinal canal, under which are to be included the bill, the tongue, the mouth, the pharynx, the œsophagus, the crop, the proventriculus, the stomach, the duodenum, the small intestine, the cœca, the rectum, and the cloaca. The liver and pancreas, with the salivary glands, the mucous crypts, and the bursa Fabricii, might also be included. Some of these parts, as the bill and cloaca, are subservient to other purposes, but their primary function has relation to digestion.

I have been convinced by observation that correspondences in the part of this system of organs, are met by analogous correspondences in the habits and forms of birds; and whether it should really be found entitled to form the basis of an arrangement or not, its examination must tend to elucidate much that is obscure, and lead to important physiological results.

The digestive organs of birds, considered in the different species, are capable of being arranged into groups, of which at least twenty, indicative of as many orders or families, might be enumerated.—Thus:

1. Œsophagus very wide, of nearly uniform diameter; stomach large, membranous, with separate muscular fasciculi; intestine short and slender; cœca rather long, narrow below, dilated towards the extremity; rectum with a large dilatation. Owls.
2. Œsophagus very wide, dilated on the neck; stomach large, membranous, its fasciculi not distinct; intestine slender; cœca extremely small, cylindrical. Eagles and Hawks.
3. Œsophagus wide, nearly uniform; stomach large, membranous, with large fasciculi; intestine short; cœca small. Kingsfishers.
4. Œsophagus extremely large, of uniform diameter; stomach very small, rather membranous than muscular, but with a cuticular lining; intestine short; two small cylindrical cœca. Gulls.
5. Œsophagus extremely long and wide, of uniform diameter; stomach small and membranous; intestine long and very narrow; no cœca, but in place of them a dilatation of the rectum projecting beyond the insertion of the small intestine. Herons.
6. Œsophagus long, narrow, of nearly uniform diameter; stomach a powerful gizzard, with two strong, two-tendoned muscles, a portion of one of which covering the fundus has its insertions below the central tendon: intestine long and wide; cœca long, nearly cylindrical. Swans, Geese, Ducks.
7. Œsophagus rather narrow; a large crop; stomach a powerful gizzard; intestine rather long and wide; cœca about half the length of the intestine, of great capacity, and having their mucous coat elevated into longitudinal ridges. Grous, Partridges, Pheasants.
8. Œsophagus rather narrow, but dilated into a large crop; stomach a powerful gizzard; intestine long, of moderate width; cœca extremely small. Pigeons.

In this manner, giving more detailed characters, and including structural differences (such as the longitudinal rugæ in the rectum of ducks, the villous plicæ in the cœca of grous, the smoothness, rugosity, or scission, of the cuticular lining of gizzards, the forms of the proventricular glandules, the modifications of the crop, which is muscular in eagles, perfectly membranous in some conirostres, glandular in grous, in the crossbill curved to the right so as to pass behind and almost encircle the neck, the arrangement of the horny papillæ of the mouth and fauces, the number of salivary glands, and the varieties presented by the tongue and bill,) I am persuaded from experience, that not only might birds be grouped according to the agreement of their digestive apparatus, but that the groups thus produced would be perfectly natural, in respect at least to their principal habits.

It is not of much importance with what tribe of birds we begin; but as the rapacious species generally take the lead in systems, I shall not deprive them of their rank. And here, once for all, I must remark, that in every particular, the descriptions will be entirely original, that is, the result of my own observation.

I. *Digestive Organs of the Diurnal Rapacious Birds.*

As unexceptionable representatives of the aquiline and buteonine groups of this order of birds, we may take the Golden Eagle, *Aquila chrysaëtus*, and the Common Buzzard, *Buteo vulgaris*.

Plate IV. represents :–Fig. 1. the bill, 2. the palate, 3. the tongue, 4. the intestinal canal, 5. the rectum and cœca, of the Golden Eagle, one-third of the natural size.; Fig. 6. a section of the proventriculus, 7. some of its glands, 8. the pylorus :—6 and 8. of the natural size, 7, enlarged.

The bill of the Golden Eagle, Plate IV. Fig. 1, is shorter than the head, very deep, compressed towards the end, with a longish decurved tip. The upper mandible has at the base a broad cere, *a*, or bare coloured skin; its dorsal outline, *b*, is slightly convex as far as the edge of the cere, then curved so as to form rather more than the fourth of a circle; the ridge, on the cere, is broad and convex, on the horny part narrow but convex; the sides at the base are nearly flat and sloping, towards the end erect and slightly convex; the edges towards the base, *c*, are soft, being covered with skin, continuous with the membrane of the mouth, beyond the nostrils sharp, direct, with a slight festoon; the tip decurved, subrigonal, acute. The lower jaw has the crura widely separated at the base, so that the angle at the base of the horny mandible is broad and rounded; its dorsal outline, *d*, is convex, the back broad, towards the end narrowed; the sides rounded; the edges at the base covered with skin, towards the end horny, inflected and sharp, and curving downwards to the tip, which, viewed vertically, is broadly rounded. The dorsal outline of the upper mandible is $2\frac{1}{2}$ inches long; that of the lower $\frac{10}{12}$; the edge of the lower is $2\frac{1}{4}$; the height of the bill at the nostrils $1\frac{2}{12}$.

The mouth is wide, measuring $1\frac{7}{12}$ across. The palate, Fig. 2, is flat, at the sides smooth and sloping a little upwards, in the middle having a longitudinal depression, *a*, into which the tongue fits. This depression is bounded by two parallel ridges of skin, having on their summit minute papillæ directed backwards. In it behind the base of the tongue is the narrow elliptical aperture of the nares, *b*, of which the slit, *c*, extends forwards nearly to its termination. At the commencement of the slit behind, is, on each side, a transverse papillate flap, *d*, and another behind the aperture, *e*; at its anterior extremity is a soft prominence, from which proceeds forwards a soft ridge, *f*. The tip or horny part is slightly, the lower mandible deeply, concave.

The tongue, Fig. 3, is $1\frac{6}{12}$ long, fleshy, rather narrow, concave above; its sides nearly parallel, the tip, *a*, rounded and distinctly emarginate, its free part beneath horny; the lower surface of the sides toward the base furnished with large mucous crypts; the base, *b*, concave in its outline, and fringed with pointed papillæ directed backwards. The space between the base of the tongue, *b*, and the aperture of the glottis, *c*, is covered with mucous crypts, of which there is also a lateral series on each side, *d*; and the posterior part of the pharynx is supplied with similar bodies irregularly disposed. The aperture of the glottis, *c*, is defended behind by a number of papillæ, *e*, directed backwards, and arranged in two lateral lobes, with a small intermediate one.

Fig. 4 represents the intestinal canal in its natural position, viewed from before; *a b* being the tongue, *c d* the trachea. The œsophagus, *e i*, measured from the base of the tongue to the stomach is 13 inches long. At its commencement it has a diameter of 2, gradually contracts to $1\frac{1}{2}$; about the middle of the neck, or 4 inches from the tongue, it dilates so as to form a kind of crop, *f*, capable of being distended to a diameter of more than 3 inches, and lying rather to the right side, the trachea, *c d*, passing along the left. On entering the thorax at *g*, the œsophagus again contracts to about 1 inch, and at its termination, *i*, enlarges to $1\frac{1}{2}$, forming the proventriculus, *h*, which is $1\frac{1}{2}$ long.

At its upper part, the œsophagus has a slight outer layer of inconspicuous muscular fibres. It is encircled by transverse fibres, forming a distinct coat. The inner or mucous coat is thrown into longitudinal rugæ when the organ is contracted; otherwise it is smooth and even. For a short space above the proventriculus, *h*, there is a circle of distinct longitudinal fibres. Over the proventriculus itself, the fibres are all transverse; and below it, at *i*, they are more conspicuous. Between the muscular and mucous coats of the proventriculus, are interposed numerous glandules, placed in apposition, nearly at right angles to the surfaces of these coats. Fig. 5 represents a longitudinal section of the walls of the proventriculus, of the natural size: *a* the outer or muscular coat, *b* the inner or mucous coat, the glandules, longer in the middle and shorter towards the two extremities of the organ, being interposed between the coats. These glandules are of a cylindrical form, and have a central cavity with thick walls, and a spongy inner surface. A few of them are seen enlarged at Fig. 6. Their inner extremity is narrower, and they open on the mucous membrane, *b*, by an inconspicuous aperture, placed in the centre of a small rounded eminence. See plate VI. Fig. 5. The intervals between these eminences on the mucous surface, are minutely granulate, with tortuous grooves. The fluid which is secreted by these glands is of a greyish-white colour, and when cold of the consistence of slightly coagulated albumen. The walls of the proventriculus in the middle, narrowed towards the edges above and below, the glandules in its central part being $\frac{3}{12}$ long, with a diameter of rather less than $\frac{1}{12}$. Its internal cavity is not wider than that of the œsophagus immediately above it.

The stomach, *k*, which may be considered as commencing at the lower edge of the proventriculus, is of a roundish form, 3 inches long, 2$\frac{1}{4}$ in its greatest breadth, somewhat compressed. Under its peritoneal covering is a large quantity of fat. Its muscular coat is thin, and is composed of fibres arranged in fasciculi, which are broader in the middle, or along the edges of the organ, and are inserted into two thin tendinous spaces; one on each side, about $\frac{7}{12}$ in diameter. At the upper or anterior part, these fibres diverging, leave an angular space on each side, at *i*. The inner coat of the stomach, to which the muscular fasciculi are adherent by the intervention of cellular membrane, is of a dense texture and reddish white colour. The inner surface is smooth, glossy, minutely granulate, the papillæ being arranged in tortuous lines.

The œsophagus at its upper part is placed directly on the middle of the neck, but gradually inclines to the right side, on which the crop lies unless when distended. At the lower part of the neck it inclines to the left side, passes into the thorax in the centre, when the trachea, *c d*, which passes along the left side, comes in front of the œsophagus and bifurcates immediately behind the base of the heart. The œsophagus continues inclining to the left side behind the left lobe of the liver, and joins the stomach opposite the last ribs. The stomach occupies the middle and left side of the abdomen, and when distended nearly fills the half of its cavity. It is somewhat nearer the sacrum than the anterior parietes.

The pylorus, which is represented by Fig. 7 of the natural size, is placed on the anterior curved edge of the stomach, as seen at *l*, Fig. 4, about half an inch from the edge of the cardiac orifice, and a little inclined to the right side. It is closed by a kind of valvular apparatus, there being on the side next the œsophagus two prominent longitudinal rugæ, Fig. 7, *a*, *b*, and opposite them on the other side a small prominence, *c*.

The intestine, which is 50 inches long, first curves to the left, *l*, *m*, along or anterior to the edge of the stomach, until it nearly reaches the sacrum, and is then bent back in a parallel direction, curving forwards to pass under the right lobe of the liver at *n*. This fold, which may be named the duodenum, is connected by a reflection of the peritoneum, on which lies the pancreas, *o*. After receiving the two pancreatic and two biliary ducts, it becomes attached to the mesentery, makes a sweep backwards along the right side of the abdomen, is curved upwards and convoluted in the mesentery, then becomes attached to the lower edge of the stomach, forms a small fold similar to the duodenum, ascends along the back of the stomach, in coming off forms another fold, and then terminates in the rectum, which curves along the sacrum, supported by the narrow meso-rectum.

At its commencement, the duodenum is narrow, but suddenly enlarges to $\frac{7}{12}$, of which diameter it continues. Beyond the entrance of the biliary ducts, the small intestine gradually but irregularly diminishes to a diameter of 2½-12ths, its narrowest part being at the end. There is no appearance of colon therefore; a circumstance common to all birds examined by me.

In Fig. 4, *q*, *r*, indicate the extremity of the rectum, the rest being concealed. Fig. 8 represents that portion of the intestinal canal. At the termination of the small intestine, *a*, are two very small cœcal appendages, *b b*, which are cylindrical, rounded at the extremity, directed forwards, adherent, $\frac{3}{12}$ of a inch long, $\frac{1}{12}$ in diameter, with a very narrow mucous cavity. They come off on opposite sides, one generally a little below the other.

The rectum, *b*, *c*, is at once enlarged to $\frac{5}{12}$, continues to widen, and terminates in an elliptical or subglobular dilatation, *d*, beyond which is a short space separated from the rectum by a sort of ring or contraction, and which is named the cloaca, *e*.

Besides the peritoneal covering, the intestine has a muscular and an inner or mucous coat. The former is thickest in the duodenal portion, the inner surface of which is smooth, with scarcely any villosity, and even, without rugæ, being at first similar to that of the stomach. On the rest of the small intestine are long, extremely slender villi, which toward its lower part become more sparse. The inner surface of the cœca has a cellular appearance that of the rectum is furnished at its anterior part with numerous mucous crypts. On the elevated ring or kind of valve which separates the rectum from the cloaca, open the two ureters, *g*, *g* ; and behind it is the entrance to the bursa Fabricii, a large oval bag lyover or behind the end of the rectum, and of which the inner surface is coarsely rugous, with rounded prominences, and numerous irregular cellular cavities, secreting a mucous fluid. The inner surface of the cloaca is smooth, and it is closed by a strong sphincter.

The above description is taken from a male bird shot in Lochaber in the winter of 1835. In a female, which had been kept in a state of captivity for several years, the dimensions of the intestinal canal were as follows :

Œsophagus $12\frac{3}{4}$ long, dilated on the neck into a crop $5\frac{1}{2}$ long, and 3 in diameter, then contracted to $1\frac{1}{4}$; the proventriculus $1\frac{1}{2}$ in diameter. The stomach, $2\frac{1}{4}$ long, its tendons $\frac{9}{12}$ in diameter. The intestine 66 inches long ; at the commencement it has a diameter of $\frac{5}{12}$, but immediately enlarges to $\frac{10}{12}$, and so continues for 12 inches, when it gradually contracts, so as near the cœca to be only $\frac{5}{12}$ across. The cœca are $\frac{4}{12}$ long. The rectum is 7 inches in length, its dilated part 2 in diameter.

The crop and the stomach may present different appearances in individuals, according as they are more or less full or empty when the bird is killed. When empty and contracted, they can scarcely be inflated to so large a size as that which they present when they have been stuffed with food by the bird. In the latter case, they retain, when emptied after death, the form given to them. Persons therefore, measuring their dimensions in these different conditions, would differ greatly in their statements. The measurements given above and in the sequel, are taken from the parts inflated with air.

I shall now offer a few remarks on the digestive process. By means of the sharp-edged, strong mandibles, and the pointed decurved tip of the upper, the eagle tears up fragments of flesh from the quadrupeds or birds which it has captured with the aid of its powerful wings and feet, and killed by thrusting into them its long, curved, tapering, very acute claws, or from animals which it may have found dead. If the supply be plentiful, it fills the stomach, and afterwards the crop ; for I have found them both completely crammed, both in this species and in other birds of the family. It is not nice in selecting its morsels, but swallows along with them bones, hair, and feathers, in considerable quantity, when the prey is small. The crop or dilatation of the œsophagus is merely a recipient of the food, which is found in it quite unaltered, and it is entirely destitute of mucous crypts. When the crop, stomach, and intermediate space are found filled, the solvent action is first perceived in the proventricular space; but it is doubtful if the secretion from its glandules effects the solution; for, on examining the parts, we find the fluid of the glands uniformly diffused over its surface, and covering the interior of the stomach, sometimes in its whole extent, but generally in its upper part. In this state, the proventricular fluid, coagulated as it were, might, on a superficial examination, be considered as the inner coat of the stomach dissolved by the gastric juice. When the soluble part of the contents of the stomach has been reduced to a pulpy state, it passes through the pylorus, which rejects the hair and feathers. These, with undissolved bones, cuticular linings of gizzards, seeds and other vegetable substances, are, by the contraction of the muscular fibres, thrust into the œsophagus, and vomited in dense pellets. In the duodenum, the pulpy mass is farther diluted, has a light-red colour, and seems to undergo a farther digestion. On being mixed with the bile it assumes a light-greenish tint, and deposits the chyle on the surface of the intestine, whence it is absorbed. Towards the lower part of the small intestine, it becomes darker and thickens, and the refuse enters the rectum in a cylindrical rather concrete form. There it is diluted with mucus and urine, and is finally ejected at once in a semifluid state, of a dark-green colour, mixed with flakes of white.

The intestinal canal of the Common Buzzard, *Buteo vulgaris*, is so remarkably similar to that of the golden eagle, that the same description might answer for both, unless with respect to the actual dimensions.

The bill is proportionally much smaller, less deep, and having the outline of the upper mandible more sloped; but in other respects it bears a great resemblance to that of the eagle. The mouth is wide, measuring $1\frac{3}{12}$ across; the palate, flat anteriorly, having a broad soft ridge, from the posterior part of which proceed backwards two very prominent, nearly parallel soft ridges, bearing small pointed papillæ. Between them is the depression which corresponds to the tongue. A transverse papillate edge proceeds inwards from the middle of these ridges, and they terminate in a similar curved edge behind. The posterior aperture of the nares is narrow-elliptical behind, linear before, with papillate margins. The tongue and other parts of the mouth are as in the Golden Eagle.

In Plate V. is represented the intestinal canal of a male individual of this species. Fig. 1 exhibits a lateral view of the organs in their natural position, diminished to half their size, the parts marked with the same letters as Fig. 4 of Plate IV. There are here seen in addition, the bursa of Fabricius, *s*; a section of the lung, *t*, the position of the heart, *u*, that of the liver, *h n*, and of the sternum, *v*.

The œsophagus, *e f g h*, is 6 inches long, dilated anterior to the thorax into a large sac, *f*, $1\frac{3}{4}$ in diameter, and 2 long. Its muscular coat is strong, its inner smooth. At its entrance into the thorax at *g*, it contracts to $\frac{10}{12}$, and again enlarges to $1\frac{1}{4}$ in the proventricular part, *h*. For an inch above the latter, the fibres are longitudinal. The proventricular glands are close, cylindrical, with a narrow villous cavity, opening by a small orifice scarcely perceptible in the middle of a small rounded eminence on the inner surface, which presents the same appearance as in the eagle.

Fig. 2 is a longitudinal section of the walls of the proventriculus. Fig. 3 shows one of the glands enlarged; *a*, the gland, *b*, the mucous surface of the proventriculus, *c*, its muscular coat. Fig. 4 represents, at *a* three rows of the glands, at *b* the inner coat of the proventriculus, at *c* the fibres of the muscular coat reflected. Fig. 5 represents, much enlarged, the appearance of the inner surface of the proventriculus.

The stomach, Fig. 1. *k*, is $2\frac{1}{2}$ long, $2\frac{1}{4}$ broad, somewhat compressed. Its fibres are disposed in fasciculi, and the tendinous centres are $\frac{6}{12}$ in diameter. The inner surface is smooth, glistening, and minutely papillar. The pylorus, Fig. 6, has on the side next the cardia three prominent rugæ or valves, *a*, and opposite them on the other side two small prominences. The intestine is 54 inches long. The first fold, *l*, *m*, *n*, occupies the same position as in the eagle, and the other parts may be described in the same manner. The cœca, Fig. 7, *c*, *c*, are $\frac{3}{12}$ long, cylindrical, the rectum, *a*, $4\frac{1}{2}$ long, much dilated.

The inner surface of the upper part of the duodenum is like that of the stomach. On its lower part and on the small intestine are very long extremely delicate villi, which gradually become fewer. The other parts are as in the eagle.

In another male, the œsophagus was $7\frac{1}{2}$ inches long, the stomach 3; the intestine 51; the cœca $\frac{3}{12}$; the rectum $4\frac{1}{2}$.

In a female, the œsophagus was 8 inches long, its sac 3 long and 2 in diameter, the proventricular part $1\frac{1}{2}$; the stomach 2 in diameter, $1\frac{1}{2}$ in thickness, its tendons $\frac{8}{12}$; the intestine 56, its diameter below the pylorus only $\frac{4}{12}$, but presently $\frac{8}{12}$, its smallest diameter $2\frac{1}{4}$-12ths; the cœca $\frac{2}{12}$ long; the rectum at first $\frac{6}{12}$ in diameter, half way down $\frac{8}{12}$, in its dilated part 2 inches.

The appearances presented by the alimentary mass in its progress are the same as in the Golden Eagle. The mouth, œsophagus, and stomach, are plentifully lined with mucus. The food undergoes no change in the crop, but begins to be dissolved in the proventriculus. Digestion is accomplished in the stomach and duodenum ; the chyle is absorbed in the small intestine, and the refuse passes into the rectum, whence, diluted with the urine, it is ejected in a mass, and thrown to a distance.

III.—*Botanical Notes.* By CHARLES C. BABINGTON, M. A. F. L. S. &c.

Callitriche pedunculata.—A common form of this plant having been often mistaken for C. autumnalis, I give the following short account of such of its varieties as have been noticed by me. In a specimen sheet of the second (inedited) edition of *Bluff and Fingerhuth's Compendium Floræ Germanicæ,* which has accidentally fallen into my hands, a very detailed account is given of the German species and varieties of this most variable genus. It is extracted from Kützing's monograph in Reich. pl. crit. ix. p. 31–42, *f.* 1179–1220. I suspect that our plant is not included, but from not having access to those plates, I cannot be quite certain, and have therefore named my varieties.

C. pedunculata.—" Fructiferous peduncles more or less elongated, without bracteæ at their base ; fruit regularly tetragonal, each portion obtusely carinate at the back."—Arnott.

- *α. vera.* Fruit stalked.
  - *a. lineata.* Leaves linear.
  - *b. spathulata.* Leaves ovate or oblong-spathulate.
  - *c. verna,* cæspitosa, DC.?
- *β. sessilis.* Fruit not stalked, leaves all linear, or a few of the upper ones subspathulate elongated.

This plant under all its forms may be at once known by the apparently constant absence of bracteæ, which, together with its very slender, elegant, and pellucid appearance, (except in subvar. spathulata,) distinguishes it from *C. verna.* Its obtusely keeled fruit, about equal in size to that of C. verna, also points out its difference from *C. autumnalis,* which has fruit of full twice that size, and strikingly contrasted with the dark-green foliage by its much paler colour.

The varieties appear to be caused by its place of growth. The fruit is always, as far as my observations go, sessile when the plant inhabits deep water, such as that of the Welsh lakes and rivers, and the leaves become slightly spathulate if its top reaches the surface. The varieties with stalked fruit grow in shallow water (*a*,) or on wet mud not often flooded (*b*.) Var. *a* is a peculiarly slender and delicate plant, and very small in all its parts; in *b* the internodes are much shortened, the leaves small, ovate, or shortly spathulate, and the stem rooting at many of the joints. The linear leaves are usually emarginate, and those which reach the surface of the water have generally three nerves.

Var. β. is the most common form. I have noticed it in St Leonard's Forest, Sussex, in lakes and rivers near Snowdon and in Anglesea; *a.* occurs at Caernarvon, and near the Mona Inn, Anglesea; *b.* I have only seen near Bethws Garmon, Caernarvonshire.

Hieracium, n. s.?—Scyons very short and densely leafy. Leaves sessile, oblong-lanceolate, acute or rounded, entire, beset with numerous long silky hairs on both surfaces, each hair thicker towards its base, and springing from a small dark-coloured bulb, which is more apparent on the upper surface, on account of the absence of the dense white wool with which the under surface is quite covered. Scape 1-flowered, leafless, covered with numerous long white silky hairs with a black base, and intermixed with them a good many small black short ones, each bearing a gland at its top. Flower large, pale-yellow; involucrum very like that of H. alpinum, its bracteæ in two rows, with a few lax smaller ones at the base, each bractea broadly linear, lanceolate, acute, covered with dense white wool, and bearing very numerous long silky hairs with a black base, these latter not extending to the margins.

This plant differs very much in habit from H. pilosella, and may be distinguished, at first sight, by its very short and leafy scyons, much longer leaves, larger flowers, and copious silky pubescence.

In the three latter characters it almost exactly resembles H. alpinum. It also closely approaches H. pilosellæforme, Fl. Helv. v. 72, but differs in the shape and peculiar pubescence of its involucral bracteæ.

The only British station for this plant, with which I am acquainted, is Craig Breidden, Montgomeryshire, where it grows upon the crags of a lofty precipice. This station is referred by Dr Hooker, from an inspection of my specimens, to H. alpinum in his Brit. Fl. ed. 3, p. 348.

Taraxacum dens-leonis, Desf.—As it is probable that all the European plants, referred to this genus, form only one very variable species, I do not attempt to form a specific character.

Leontodon taraxacum, Linn. Sp. Pl. 1122.

a. officinale. Leaves runcinate, with the terminal lobe largest, outer involucral bracteæ lanceolate, reflexed.

a. verum. Leaves broad runcinate.
L. taraxacum, Auct., Eng. Bot. t.
L. officinale, Withering. iii. 679.
L. tar. I. Gaudin, Fl. Helv. v. 61.
L. tar. *α.* oleraceum, Bluff et Fingerh. ii. 266.
Taraxacum dens-leonis DC. Bot. Gall. i. 300.

b. angustifolium. Leaves slender, runcinato-pinnatifid.
Dens-leonis angustioribus foliis, Ray, Syn. 171.
L. tar. *β.* Sm. Eng. Fl. iii. 349.
L. tar. *β.* arenarium, Bluff et Fing. l. c.
Narrow Dandelion, Petiver, H. B. t. 11. f. 8.

Leaves oblong, runcinate, the segments pointing downwards, more or less triangular, acute, denticulated above the incisions, seldom or never reaching the midrib, (except perhaps in var. *b* in which the leaves are narrow and deeply pinnatifid ;) the terminal lobe large, round at the end, and usually the broadest part of the leaf, midrib very broad and longitudinally striated, the striæ usually 5. Scape smooth, tall, thick, seldom much longer than the leaves. Involucral bracteæ long, lanceolate, the outer ones not much shorter than the inner row, (except a few at the base,) reflexed. Fruit dull yellow, oblong-oval, compressed, striated, with two strong ribs on each side, two weaker ones in the centre, and two between each of them and the dilated margin, its upper half roughish, with numerous rigid papillæ, becoming longer, and taking nearly the form of spines at the dilated apex of the fruit, which is suddenly attenuated into a very long slender rostrum. Pappus rough with minute alternate teeth.

Of this variety I need say nothing, as it grows in every field and waste place. The synonym of Ray is referred to my subvariety *b.* from the observation of Sir J. E. Smith, that " its calyx scales retain their due proportion and position," and from the figure of Petiver ; although the description given by Ray would apply equally well to the var. lævigatum. He says it differs from the type of this variety, " foliis paucioribus et angustioribus, profundius laciniatis, semine etiam rufo, cum illius citrinum sit."—I have not seen this plant.

β. *lævigatum*. Leaves pinnatifid with two intermediate teeth, outer involucral bracteæ ovate-lanceolate, patent, not reflexed.
T. lævigatum, DC. Bot. Gall. i. 300.
L. tar. II. lævigatum, Gaud. l. c.
L. alpestre et arcuatum, Bluff et Fing. l. c. ?

Leaves slender, pinnatifid, with two small tooth-like processes (on both sides of the midrib,) in each interval between the long narrow acute segments which point downwards; the terminal lobe smaller than the others, acute, often forming merely a point to the leaf; in some cases the segments are all enlarged, and the leaves approach the runcinate form of var. officinale, the tooth-like processes being seated more or less upon the upper edge of the segments; (in one of my specimens a single leaf is so much widened as exactly to resemble those of var. officinale;) midrib narrow, with three longitudinal striæ. A specimen from Sussex has the leaves much longer, with greater intervals between the segments, and the tooth-like processes filiform and very minute. Scape smooth, slender, usually erect, longer than the leaves, sometimes twice their length. Involucral bracteæ with slender white margins; the inner ones rather broadly lanceolate, obtuse, the outer very short, ovate-lanceolate, erect, patent, not recurved. Florets often tubular for three-fourths of their length. Fruit red, clavate, striated, the ribs less strongly marked than in var. officinale, its upper part very broad, armed with strong spines for about one-fourth of its length, and gradually attenuated into the beak, the base of which is red like the fruit, for a short distance. Pappus rough, with minute alternate teeth, not smooth (lævis) as described by Gaudin.

This form of our variable plant occurs on banks, walls, chalk-hills, and other dry places, also on the sands near the sea. I have received it from Sussex, through the kindness of Mr Borrer, and have gathered it at Cleyhorf, on the Gogmagog hills, Cambridge; and in Anglesea on the sands near Llyn Coron and Malltraeth. The Cambridge specimens are far less elegant than the others, approaching most nearly in appearance to var. officinale. This plant is usually so slender in all its parts as to attract attention from its beauty, and is probably far from rare, but has been passed over as an accidental variety.

I have seen small specimens, which I cannot refer to either of the other varieties, having the leaves obovate, strongly dentate, but hardly runcinate, and narrowing into a long petiole, the inner involucral bracteæ lanceolate, obtuse, the outer row broadly ovate-lanceolate, short. I at one time supposed that this might be T. obovatum, DC. and Willd. Hort. Berol. t. 47; but on examining that excellent plate, it appears that the plant there given differed materially from any plant which I have noticed in Britain. It has the inner involucral bracteæ acute linear, the outer lax and lanceolate; scape with its upper half beset with spreading hairs; the fruit with four longitudinal furrows, and several transverse lines at its base, giving that part a granulated appearance; the upper quarter of its length is covered with very strong spinose teeth, and it is suddenly contracted into the beak. I cannot help thinking that this also is a var. of T. dens-leonis.

γ. *palustre.* Leaves narrow, nearly entire, outer involucral, bracteæ ovate, adpressed.

L. palustre, Smith, Engl. Bot. t. 553.
L. taraxacon, With. l. c.
T. palustre, DC. l. c.
L. taraxacum, III. palustre, Gaud. l. c.

Leaves long, narrow, nearly entire, or moderately toothed, not runcinate, the teeth pointing downwards; midrib reddish, very wide in proportion to the leaf, striated, but in a less marked manner than in either of the other varieties. Scape smooth, rather thick, oblique, often bent, slightly woolly beneath the involucrum, but little longer than the leaves. Involucrum with the internal row of bracteæ lanceolate, edged with white, rather blunt, the external ones broadly ovate, acute, short, imbricated, erect, always adpressed, never recurved, except when the seed is quite ripe.

A very different plant in appearance from either of the other varieties; but there are so many intermediate forms that it must be deprived of its rank as a species.

It is not uncommon in wet marshy places, such as the fens of Cambridgeshire.

Briza, n. s.?—Spikes ovate, about seven-flowered; glumes shorter than the paleæ; ligule lanceolate, very long, fixed by its back to the leaf.

This plant differs from B. media in the structure of its ligule, which is exactly that of B. minor, *i. e.* very long, lanceolate, fixed by its back to the leaf, and having its apex free. It differs from B. minor in having a creeping root, and the habit and flowers of B. media. It is often more than a foot high, and flowers in August.

Near Bath: gathered in 1833. This is the plant given in my Fl. Bath as B. minor. If a new species, perhaps *autumnalis* might be considered an appropriate name, as its allies are earlier flowering plants.

Alopecurus fulvus.—A careful examination of this plant and A. geniculatus, has shown me the following distinctions between them:

A. fulvus.—Flowers one-third less than those of A. geniculatus; palea as long or longer than the glumes; awn inserted just below the middle of the palea, and slightly longer than it; anther short and broad. Sheaths of the leaves white between the ribs, with very minute hoary granules. Panicle very long.

A. geniculatus.—Palea shorter than the glume; awn inserted near to the base of the palea, and twice its length; anther linear. Sheaths of the leaves without hoary granules. Panicle shorter.

Festuca duriuscula, γ. hirsuta. F. hirsuta, Host.?—Root black, fibrous. Radical leaves setaceous, glaucous, half as high as the stem; stem leaves involute; sheaths three or four times as long as the leaves. Stem obsoletely quadrangular, covered with very minute down. Spikelets four or five-flowered. Glumes hairy; external palea very densely pubescent, internal glabrous, with its margin ciliated; anthers two or three times as long as their filaments.

I have drawn up the above description of this plant on account of its not having been noticed in any work on the plants of this country. Gathered on the summit of Pen y Gader, the highest summit of Cader Idris, Wales, July 1832.

Polypodium calcareum—may always be distinguished from P. dryopteris by being minutely mealy in all its parts. Each particle of this mealiness, under a high magnifying power, appears to be a minute stalked gland. I have not been able to find any trace of this on P. dryopteris.

IV.—*The Characters of two new Genera of South African Reptiles, with descriptions of species belonging to each.* By ANDREW SMITH, M. D., M. W. S., &c.

IN the year 1825, I first obtained the Cape species of the genus *Chrysopelea,* and on examining it, I observed some peculiarities of formation which were not exhibited by any of the genera of serpents with which I was acquainted. From that circumstance, I was immediately led to set it apart as a type for an additional division, and, from the singular manner in which the abdominal plates were formed or apparently divided, I constructed the term Aspedotrischedis to designate the new genus.

Soon after that I had a visit from my late friend, the lamented M. Boie, on his way to Java, when I substituted the name *Chry-*

sopelea, in consequence of having learnt from him that he had, previous to his departure from Europe, observed like appearances in the Coluber ornatus, and had on that account separated it from the other then constituted genera, under the title of Chrysopelea ornata. Though the term employed by me was originally framed as the designation of a genus for the Cape species, without any knowledge of what had been accomplished in Holland, yet that of M. Boie had priority as its patron, and to whatever enjoys that, an immediate and unqualified preference ought invariably to be given. Whoever had the pleasure of witnessing the noble candour and liberality of that celebrated and highly talented naturalist while he was alive, could scarcely feel disposed to act otherwise towards his memory, and it must always be a source of regret with the lovers of natural history, that an individual so eminently calculated to advance their favourite science should have almost immediately fallen a victim to the deleterious effects of the climate of the country he was appointed by his government to explore.

The three species of the other form, for which I have established the genus *Pleurotuchus,* present certain of the characters of the *Scinci,* but at the same time have several others peculiar to themselves, amongst which one of the most particular is an elevated longitudinal fold of skin, which extends from the angle of the mouth to the base of each hinder extremity, the one edge of which is loose and directed upwards, so as to conceal when undisturbed a narrow stripe of minute granular or wàrty-looking bodies, which, instead of scales, cover the skin immediately above its base or fixed edge.

CLASS REPTILIA. ORDO SAURI. FAMILIA SCINCIDÆ. GENUS PLEUROTUCHUS.

CH. GEN.—*Caput* quadrangulare, supra scutatum.

Dentes in maxillis et palato, priorium æquales, fixi approximatè, sublongi, cylindrici, acuminatè et confertum applicati ad superficiem internam ramorum, ultimi breves acuminati cylindrici et in seriebus duabus profunde in ore siti.

Lingua crassa depressa et apice incisa.

Oculi palpebris duabus, pupillis circularibus.

Corpus subquadrangulare, dorso lateribusque squamis quadrangularibus carinatis tectis; abdomine scutis quadratis in fasciis transversis, gutture hexagonis. *Plica* longitudinalis cutis prominens inter angulum oris et extremitates posteriores.

Cauda subcylindrica, verticillata, et squamæ, exceptione illarum prope anum, valde carinatæ.

Pedes quatuor, dactyli quinque; digiti palmarum breves, 2dus et 3ius fere æquales, posteriorum longi, 2dus longissimus.

Pori femorales.

1. Pleurotuchus typicus.—*Supra brunneus, dorso duobus lineis longitudinalibus albis et duobus nigro variegatis; lateribus maculis subflavis notatis; subtus flavo-albus.*

Back and sides brownish, the former with two longitudinal lines on each side, the outermost white and narrow, the innermost black and rather broader. Both commence at the outer corners of the eyes, run in contact with each other, and the white one terminates near the commencement of the tail, while the other extends nearly half way to its point, and there, after uniting with its fellow of the opposite side, gradually disappears. Sides variegated by small, somewhat square, spots of a yellowish cast, and the ground colour is clouded and mottled with darker tints, which in some places approach to black. Belly yellowish white; tail tinted with brownish, brownish-red, and yellowish-white, but disposed in no regular order. Legs and toes the same colour as the body, without variegations. Femoral pores sixteen in number; ten longitudinal rows of plates on belly. Length from nose to anus four inches, from anus to tip of tail seven inches and a-half. This lizard inhabits the dry sandy flats of Little Namaqualand, and is rather abundant towards the mouth of the Orange river, where it is called by the native Hottentots *Ouru-kaima-aap.* Its motions are very quick, and when discovered upon open ground runs towards the roots of the first bush it can find, and from thence if pursued into any hole it can perceive, but if one cannot be discovered, it even attempts, and frequently succeeds, in forcing itself under loose sand, so as to escape detection.

2. Pleurotuchus Desjardinii.—*Supra sub-brunneus, dorso fasciis duobus longitudinalibus, exteriore albo, interiore nigro, maculis nigris maculatis; lateribus lineis verticalibus nigris et albis notatis; subtus flavo-albus.*

Colour of back and sides brownish, with two longitudinal lines or stripes on each side of the former, the outermost white, and the innermost black; those of each side in direct contact, commence behind the eye and terminate on the root of the tail; along the centre of the back an irregular row of black spots, each marked with one or more dots of white. Sides variegated by narrow vertical stripes alternately black and white, below yellowish white; legs greenish brown, variegated with a few white spots; femoral pores about twelve in number; eight longitudinal rows of plates on belly. Length from nose to anus three inches and a-half, from anus to tip of tail five and a quarter. Inhabits the country alongst the south-east coast, and is usually found in damp retired situations, either in wooded spots or in their neighbourhood. Named in honour of M. Desjardins, Secretary of the Natural History Society of the Isle of France.

3. Pleurotuchus chrysobronchus.—*Supra brunneus, dorso duabus lineis flavis et duabus nigris notatis; lateribus brunneis, griseo umbratis; guttere flavo; abdomine livido-albo.*

Colour above brown, with four longitudinal stripes on the back, the two outermost yellow, the two innermost black; upper part of sides brown; lower brown, shaded with gray; anterior part of throat a fine bright light yellow; belly bluish white; legs and toes brown; length of body four inches; length of tail six and a-half. Inhabits damp woody situations towards the sources of the Cowie river, about Graham's Town and Blue Kranz.

ORDO OPHIDII. FAMILIA COLUBRIDÆ. GENUS CHRYSOPELEA. *Boie.*

CHAR. Dentes per series 6 dispositi; *maxillares* mediocres, fere æquales; cylindrici, acuti et angulo obtuso recurvi; *palatinorum* parvi, breves, numerosi, approximati; *mandibularum* mediocres, anteriores remoti, longiores, posteriores approximati, omnes leviter recurvi.

Caput distinctum, depressum ovato-triangulare, apice rotundato rictu oris amplo; nares mediocres subverticales; oculi magni verticales, pupilla rotunda.

Truncus longus subcylindricus.

Cauda tenuis longa et triangularis.

Scuta abdominis versus extremitatem carina transversa obtusa.

Squamæ caudæ transversè carinatæ.

1. Chrysopelea Boieii. Ch. *Supra virido-brunneus, anteriore parte dorsi linea flava longitudinale variata; labio superiore, margine externa superciliorumque flavis; linea nigra longitudinale inter oculum et occiput; infra virido-flavus.*

Abdominal plates 165. Subcaudal scales 119 pairs.

Colour above greenish brown, variegated by a partial yellow line, which commences at the hind head, and extends along the centre of the back for six or eight inches. Outer edges of eyebrows clouded with yellow; upper lip pure yellow; the lowermost row of scales on each side buff yellow, and from each eye to the hind head a narrow black stripe; belly greenish yellow. The scales are disposed nearly in transverse rows, those of the dorsal row large and somewhat six-sided, those of the others oblong, linear, and one edge behind slightly elongated and pointed. Length of body two feet seven inches, of tail fourteen inches and a-half. Inhabits the Island of Ceylon, and does not appear to have been yet described.

It is named in honour of the individual who formed the genus, and though the form and mode of arrangement of the scales are different to those of Chrysopelea ornata, yet it is clearly a species of the same genus. As far as regards the character of the scales and their mode of distribution it is nearly allied to the genus Bucephalus, as described by me in one of the numbers of the Zoological Journal.

2. Chrysopelea Capensis—Ch. *supra viridi-cærulea, infra antice viridis, viridi-flavo umbrata, postice viridi-cærulea.*

Abdominal plates 216. Subcaudal scales 109.

Above greenish blue, verging towards a light slate hue; head tinted with purple; anterior part of belly light green, mottled with greenish yellow, posterior part the same colour as back; scales large, subovate, and disposed in oblique rows, as in the Chrysopelea ornata, all of them, as well as the abdominal plates and subcaudal scales, with a shining metallic lustre; eyes brown. Length from nose to anus two feet eight inches, from anus to tip of tail eleven inches. The three species probably all belong to that class of snakes which generally resort to trees to obtain their food,—at least the last described was killed when turned round the branch of a high shrub, near to the mouth of the Orange river.

As has already been remarked, the scales of the present species are arranged as in the one which Mr Boie selected for the type of the genus. Their forms also approximate to those observed in it, and thus differ in both respects from the Chrysopelea Boieii, found in Ceylon.

V.—*Characters and Descriptions of the Dipterous Insects indigenous to Britain.* By JAMES DUNCAN, M. W. S., &c. &c.

(IN the following series of papers it is proposed to give a list of the Dipterous insects indigenous to Britain, with the Generic characters, Specific descriptions, and Localities, with as much accuracy as it is possible from the materials in the possession of the author. This singular and interesting tribe of insects has been hitherto comparatively neglected by British entomologists, but several valuable continental publications have been devoted to them, and in drawing up the characters and descriptions, Mr Duncan has chiefly made use of *Meigen's Europaischen Zweiflugeligen Insecten,* and *Macquart's Insectes Diptères du nord de la France,* works of great precision and minute accuracy.—We have already to offer our acknowledgments to several gentlemen, for communications relative to the

English and Irish Diptera, and again earnestly request additional information respecting Species and Localities, which will either be introduced in the proper places, or added as supplements to the parts which may be previously published.—The species which have been found in Scotland are distinguished by a small s. after the specific name.—The next paper will include the *Tabanidæ.*—Eds.)

ORDER DIPTERA,

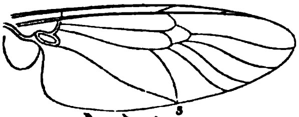
Family STRATIOMYDÆ, *Latr.*

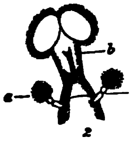
The family group of two-winged flies, distinguished by the above name, have the antennæ porrect, approximating at the base, and composed of three joints, the third, or terminal joint, divided into rings by means of faintly marked incisures. These organs are generally furnished with a style or an elongate seta at the extremity. The proboscis is short, the labella alone being exserted. The ocelli are three in number, and placed in the form of a triangle usually on the crown: abdomen oval, generally wider than the head, and flat or slightly convex, composed of five segments; wings when at rest overlapping each other, and lying along the back of the abdomen, leaving the sides of it exposed, and projecting beyond the apex. The typical genera are rather of obscure colours, having the sides of the body ornamented with light-coloured spots and abbreviated bands. The species frequent marshy places, and the larvæ, in most instances, are aquatic. The indigenous genera admit of being distinguished by the following concise external characters:

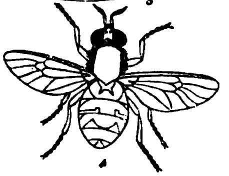
Scutellum armed; antennae,	without a terminal style, or having only a very short one;	1st joint much longer than the 2d	Stratiomys.
		1st and 2d joints nearly equal	Odontomyia.
	with an elongate style;	3d joint 4-ringed	Oxycera.
		——— 5-ringed	Clitellaria.
Scutellum unarmed; 3d joint of the antennae	orbicular;	abdomen somewhat globular	Pachygaster.
		———oblong	Sargus.
	ovate		Chloromyia.
	subfusiform		Nemotelus.

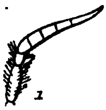
Genus STRATIOMYS, *Geoffroy.*

Antennæ rather longer than the head, directed forwards, approximating at the base, the third joint diverging obliquely; the first joint elongate and cylindrical, the second short and cup-shaped, the third very long, subfusiform, divided into five distinct rings, and without a terminal seta, (Fig. 1:) proboscis short; the labrum linear, corneous, notched in front; (Fig. 2 *b*;) palpi three-jointed,









the two lower joints subcylindric, the third somewhat thickened, obovate and pilose; (Fig. 2, *a.*) thorax oval, pubescent; scutellum semicircular, armed posteriorly with two spines; abdomen oval, flat or very slightly convex; winglets and halteres rather small; neuration of the wings as in the accompanying figure (3.)

Larva aquatic, breathing by means of a star-like radiated apparatus attached to the tail.

Stratiomys is placed at the head of this family, as exemplifying in the most characteristic manner the peculiarities by which it is distinguished. As above defined, this genus comprehends six British species, nearly all that have been ascertained to inhabit Europe. They are all of pretty large size, and very similar to each other in colour, and the distribution of their markings. The larvæ, which are admirably delineated and described by Swammerdam, under the name of Asilus,* are of singular and elegant structure, especially in their respiratory organs. In the shape of the body they are somewhat fusiform, thickest before the middle and tapering to both ends, the caudal segment much more elongated than the others, and supporting at the extremity a circle of about thirty diverging rays. These rays are beautifully feathered, capable of repelling water, and placed round an orifice in the tail, communicating with two very large tracheæ or air-vessels. When the insect desires a supply of fresh air, the tail is raised to the surface, and these rays expanded on all sides; a free communication is thus opened by a kind of obconical funnel, between the atmosphere and the aperture in the tail, even though the latter be a little beneath the level of the surface. When about to descend, the points of the hairs are drawn towards each other, and a globule of air enclosed, which shines in its passage through the water like a drop of quicksilver. The use of this air-bubble seems to be both to afford a continued supply of air, and to render the body more buoyant when it becomes necessary to re-ascend. To facilitate the same object when the air happens to be exhausted while beneath the surface, the animal seems to possess

---

* Book of Nature, (Hill's edition,) p. 43–62; pls. 39–42.

the power of again replenishing its little reservoir by forcing air into it from the tracheæ. Its motions in the water are very slow, and it advances by bending its body in different directions. Swammerdam supposed that it fed on clay and soft earth, substances which he sometimes found on dissection lodged in the stomach; but it is much more probable that its food consists of the minute infusoria which abound in the stagnant waters which it usually frequents.* It is furnished with short ciliated organs on each side of the head, which are frequently kept in a state of rapid vibration, by which slight currents are produced in the direction of the mouth,—a circumstance which would tend, on the supposition just made, to bring its food completely within its reach. When about to change into nymphs, the skin of these larvæ becomes stiff and rigid, and in that state forms an envelope for the pupa, which is contracted into an oblong figure, and occupies but a small space towards the widest end of its capacious tube. The fly is soon matured, sometimes in six or seven days, and makes its escape by forming a rent in the second segment.

It is unnecessary to advert at any length to the opinion entertained by Professor Knoch, and countenanced by Meigen, respecting the larvæ of the Stratiomydes, namely, that they are of a parasitical nature, and live in the interior of the aquatic worms above described, which according to them have long been erroneously regarded as true dipterous larvæ. The observations on which this view professes to be founded are quite inconclusive, and it is in itself so highly improbable, that it is surprising how it could be advanced in opposition to the well authenticated statements of the older naturalists.

1. STRATIOMYS CHAMÆLEON. (S.)

Musca chamæleon, *Linn.*; *Donovan,* i. pl. 31, fig. 1st, pl. 35, *larva.* Latreille, *Gen. Crust.* iv. 274. Panzer, *Fauna Germ.* viii. 24; Geoffroy, *Ins.* ii. pl. 17. fig. 4; De Geer, *Ins.* vi. 151, 1.—Swammerdam, *Book of Nat.* pl. 39 to 42.—Stratiomys chamæleon, *Meigen,* iii. 124; *Stephens,* &c.

Head and antennæ black, the former with the hypostome† black in

---

* Swammerdam affirms that these insects are found in *salt* water as well as fresh; but as this statement has not been confirmed by subsequent observation, and is contrary to what takes place in almost every other instance, it is probable that it was either made inadvertently, or that the larvæ noticed in such situations by that illustrious physiologist had been transported thither accidentally, which might easily happen by means of running water. Once conveyed thither they might survive for a length of time, for they can live upwards of twenty-four hours in spirits of wine and vinegar. So tenacious, indeed, are they of life, that after immersing them in several fluids without effect, Swammerdam's patience became exhausted, and he proceeded to dissect them alive.

† This term, which it is convenient to retain, is employed by Meigen to designate the region of the head lying between the antennæ, the eyes, and the mouth.

the males with yellow pubescence, and a yellow circle round the eyes; the hypostome yellow in the females, with a dark line down the middle; forehead black and shining, the hinder part of the head yellow: thorax dark-brown and unspotted, clothed with light brown hairs; scutellum yellow, with a triangular black spot at the base, the spines frequently tipped with the latter colour: abdomen considerably wider than the thorax, pubescent, and of a deep black above, the second, third, and fourth segments, having a triangular spot of citron-yellow on each side, the anterior pair large and triangular, the others narrower and more elongate; the anal segment with a triangular spot of the same colour in the centre: on the under side, the abdomen is dull yellow, with a narrow oblique black streak on both sides of the second and third segments, sometimes united into a continuous band on the latter, and the terminal segment edged with black: the scales at the base of the wings and the halteres yellow, the wings pale brown, the principal nervures inclining to ferruginous; legs nearly of the latter colour, the thighs brown except at the base. Length 7½–8 lines.

The chamæleon fly was so named by Goedart, because he found that it could subsist a very long time without food, a property for which that animal was long considered famous. It is not so often met with in most parts of England and Scotland as some of the following species, but it may be found occasionally throughout the summer by the sides of ponds and in marshy situations, hovering about the flowers of Caltha palustris and other marsh plants. Sides of Duddingston Loch, Braid marshes, and other similar places round Edinburgh, but not frequent. "Cardew Mire."—*T. C. Heysham, Esq.*

2. STRATIOMYS POTAMIDA.

Meig. *Zweiflugeligen Insecten*, Vol. iii. 137.—Stratiomys Potamida, *Stephens's Cat.* No. 8469.

About the same size as the preceding, to which it bears so close a resemblance that it might readily be taken for a variety; it is Meigen's opinion, however, that it is decidedly distinct, as indicated by the following characters: the scutellum, instead of having a triangular spot at the base, has a black band, continued across the surface and turned over the sides; the scutellar spines always entirely yellow; the second segment of the abdomen bears two lateral triangular spots, as in *S. chamæleon,* but on the hinder margin of the third there is a yellow band, narrow and continuous in the female, broader and interrupted in the male; the fourth segment with an entire band in both sexes; anal segment with a yellow triangle: under side of the abdomen yellowish, with four narrow black bands, the first always, and the second sometimes, interrupted: in other respects corresponding to *S. chamæleon*.

Occurs at times along with the preceding species, and is said to have been taken in the vicinity of London. " Monks Wood, Hunts." —*Charles C. Babington, Esq.*

3. STRATIOMYS FURCATA.

Stratiomys furcata, *Fabr. Meig. Stephens.*—Stratiomys panthaleon, *Fallen.* —Musca singularius, *Harris, Expos.* pl. xi. fig. 2.

Head and antennæ black, the former with light grey pubescence, two narrow yellow streaks over the insertion of the antennæ, and two marks of the same colour on the crown: thorax pitch-brown, pretty thickly clothed with greyish hairs ; the scutellum, together with its two spines, yellow, and having a triangular black mark at the base: abdomen slightly clothed with short pubescence similar to that on the thorax, the ground colour black, the sides with several straw-coloured spots ; viz. a pretty large triangular one on each side of the second segment extending a little way over the anterior edge of the third segment ; two sublinear marks on the latter emitting an obtuse salient point at the inner end directed forwards, and likewise extending across the incisure behind ; two elongate ones on the fourth segment, and the usual triangular mark at the extremity: under side of the abdomen black, with four irregular straw-coloured fasciæ, narrowed on each side to a point and not reaching the margin ; thighs dark-brown, the tarsi and greater part of the tibiæ pale yellow : wings tinged with ferruginous anteriorly. (*See Fig. 4th of the last wood-cut.*) 7–8 lines.

Scarce ; has been taken near London, and in a few other places. " In ponds, Holywood, on Belfast Lough, County Down : at Killarney."—*A. H. Haliday, Esq.*

4. STRATIOMYS RIPARIA. (S.)

Meig. *Zwei.* iii. 138.

Head of the male black, in the other sex marked like that of the female of *S. furcata*, in both clothed with long whitish pubescence: thorax thickly covered with reddish-yellow hairs, the surface pitchy brown ; scutellum and spines yellow, the former more or less marked with black at the base : hinder margin of the second, third, and fourth segments of the abdomen with a white or yellowish stripe on both sides, the anal one with a triangle of the same colour ; the rest of the surface black ; under side with three white bands not reaching to the edge, and the anus margined with the same colour : legs pale, the thighs and hinder portion of the tibiæ brown ; the wings brown slightly tinged with yellow, and having dark nervures. 6 lines.

Once taken near Duddingston; likewise found in the vicinity of London, and in other parts of England.

5. STRATIOMYS STRIGATA. *(S.)*

Stratiomys strigata, *Fabr; Meig.* iii. 139.—Musca strigata, *Gmelin.*—Hirtea longicornis, *Scopoli, Ent. Car.*—Musca tenebricus, *Harris, Expos.* pl. xi. fig. 3 ♀?

Readily distinguished from any of the preceding by having the surface of the abdomen entirely black: head, thorax, and scutellum brownish-black, clothed with tawny hairs; the spines of the latter small and yellow: eyes greenish, pubescent, with two purple fasciæ, the anterior one very narrow; antennae black: abdomen black, thinly clothed with tawny hairs, the under side with three narrow yellowish-white bands narrowed to a point at each side, and placed on the hinder margin of the segments: thighs brown; tibiæ yellow with a brownish ring near the middle and another at the apex: the tarsi tinged with brown.

The female differs in having a yellow triangular spot between the eyes and another on the hinder part of the head; the pubescence on the latter is light-coloured, and on the sides of the abdomen it is nearly pearl-white. 6–7½ lines.

Apparently occurring more frequently in Britain than any of the preceding species. "Near London," *Stephens's Catal.* "New Forest," *J. C. Dale, Esq.** "Raehills," *Rev. William Little.*

Besides the above species, Mr Stephens possesses another true Stratiomys, which he names *S. triangulata,* the characters of which have not been published.

GENUS ODONTOMYIA, *Meig.*

Antennæ longer than the head, the two first joints short and nearly of equal length, the third elongate and conical, divided into five distinct rings, the apex compressed and narrowed into a short style: proboscis rather slender; the labrum narrow and elongate; scutellum with two spines; eyes of the male with the facettes much larger on the upper than on the under side.

In its other characters this genus scarcely differs from the preceding. The two groups, indeed, are so closely allied that Meigen has latterly included both in his genus Stratiomys. This he has probably been induced to do by observing that the antennæ of *O. microleon* and *O. argentata* are of a structure nearly intermediate between the typical form of Stratiomys and Odontomyia, the first joint being a good deal longer than the second. With this exception, however, the species are sufficiently dissimilar to be entitled to a distinctive name. The larvæ, one of which is figured and described by De Geer, are aquatic, and seem in no respects to differ from those of Stratiomys.

---

* Loudon's Mag. Nat. Hist. iv. p. 265.

1. ODONTOMYIA ARGENTATA.

Stratiomys argentata, *Fabr. Meig. Zwei.* iii. 141.—Panzer, *Fauna Germ.* lxxi. fig. 20 ♂, cviii. fig. 10 ♀.—Odontomyia argentata, *Latr.*

Head and antennæ black, eyes greenish with a purple fascia, the forehead clothed with shining silvery hairs; thorax and scutellum dark-brown, with brownish-yellow pile, the scutellar spines small and inconspicuous; abdomen black, clothed throughout with silvery hairs, having a bluish tint, with an acute triangular yellow spot on each side of the second and third segment, and the anus likewise of that colour; under side black slightly tinged with green: wings vitreous, the nervures and a small spot near the middle of the costa brown; legs of the latter colour, the tibiæ ferruginous, with a brown mark near the middle.

The female differs chiefly in having the body of a deeper black and clothed throughout, except on the sides of the abdomen, with pile of a golden-green colour. 4½ lines.

Rare; has been found in the vicinity of London, and indigenous specimens are preserved in the British Museum, and likewise in the cabinet of the Rev. Mr Kirby, now in the possession of the Entomological Society of London. " Cambridge, 1832."—*Charles C. Babington, Esq.*

2. ODONTOMYIA ORNATA. (S.)

Odon. furcata, *Meig. Klassif.* i. 129, pl. vii. fig. 22. Latr. *Gen. Crust.* iv. Reaumur, iv. pl. 24, fig. 4–7?

Eyes green and unspotted; antennæ and hypostome dark brown, the latter with yellowish hairs; thorax and scutellum dark brown, clothed with rufescent hairs, the scutellum margined with reddish-yellow, and the spines likewise of that colour, with the tip black; abdomen black above, and somewhat glossy; with fulvous triangular spots on the sides, and the anal segment edged with fulvous; the under side pale, having a pair of dusky spots on the third and fourth segments; legs ferruginous, the basal half of the thighs black, and the tibiæ and tarsi more or less spotted with brown; wings transparent, the nervures yellowish.—In the female the legs are entirely ferruginous, and the forehead of the same colour, with a black line in the middle, and a spot on each side. 6–7 lines.

In spring and summer, occasional. Occurs in Roxburghshire and near Edinburgh. " Near London," *Stephens's Catal.* " Dalmeny," *Rev. William Little.*

3. ODONTOMYIA FELINA.

Stratiomys felina, *Meig. Zwei.* iii. p. 145. Panzer, *Fauna Germ.* lviii. 22? *Musca Mycroleon*, *Harris*, *Expos.* pl. xi. fig. 5.

Head and antennæ black, the hypostome with whitish hairs; thorax also black, clothed with yellow pile; the scutellum ferruginous posteriorly, the spines lighter: abdomen reddish yellow, with a broad black band along the back, dilated on the posterior segments, and leaving only a small portion at the sides yellow: under side pale green; legs ferruginous, the wings entirely transparent, with yellow nervures. 4–4½ lines.

Has been found in several parts of the country, but appears to be uncommon. "Cardew Mire," *T. C. Heysham, Esq.*

4. ODONTOMYIA HYDROPOTA.

Stratiomys Hydropota, Meig. *Zwei.* iii. 147.

About the size of the preceding or somewhat larger; the hypostome black, the region of the mouth rufescent; antennæ entirely ferruginous in the male, having the two lowest joints rufescent, and the terminal one blackish in the female; thorax shining dark-brown, pretty thickly clothed with hairs, which are whitish on the disk and tinged with yellow on the sides; scutellum with the margin and spines rufous, the latter small and tipped with black: abdomen pale green both above and below, somewhat pellucid, with a broad angular dorsal stripe, rather widest at the base, and not extending quite to the hinder extremity: legs rufous. The female has the head rufescent, with a deep black line on the forehead, the crown black, a white spot near the inner margin of the eyes, and two ferruginous spots on the vertex, the dorsal stripe wider than in the male. 5½ lines.

Not of frequent occurrence; inhabits the vicinity of London.

5. ODONTOMYIA HYDROLEON.

Stratiomys hydroleon, *Fabr. Meig. Zwei.* iii. 148. — Musca hydroleon, *Linn.*; *De Geer*, vi. pl. 9, fig. 4.—Odontomyia hydroleon, *Latr. Stephens.*

Head and thorax black, the latter with yellowish gray pubescence, the former having the hypostome clothed with fine white hairs; antennæ dark-brown; eyes green; scutellum the colour of the thorax at the base, the apex rufous, as well as the spines, which are tipped with black; the abdomen is of a clear green both above and below, the middle of the back occupied by a broad deep black stripe dentate on the sides, and not reaching either the lateral or hinder edges. The legs are pale ochreous, the hinder tibiæ usually with traces of a brown ring near the middle; wings very clear and transparent, the nervures yellow; halteres white. In the female the head is fulvous, the hypostome with two black points anteriorly, and the crown with another black spot; the margin of the eyes yellow; the pubescence on the thorax is yellowish-green, and scutellar spines entirely yellow. 3½–4½ lines.

Not so plentiful as the following, but occurring now and then on banks and in meadows. "Cardew Mire," *T. C. Heysham, Esq.* "In ponds, Holywood: Killarney, &c." *A. H. Haliday, Esq.*

6. ODONTOMYIA VIRIDULA. (S.)

Stratiomys viridula, *Fabr. Panzer, Fauna Germ.* lviii. 18. *Meig. Zwei.* iii. 149.—Odontomyia viridula, *Latr. Gen. Crust.*

Head and antennae blackish, the former with whitish silky pubescence; eyes green, with a purple band; thorax entirely clothed with short hairs of a golden or brassy colour; the hinder margin of the scutellum and the two spines yellowish: abdomen yellowish-green both above and below, with a black band along the back, rather narrow, and widened posteriorly in the male, but broad in the female, and widening suddenly on the third and fourth segments; legs entirely yellow; halteres whitish; wings with yellow nervures, and having a single submarginal cell. 3–3½ lines.

A species of frequent occurrence in damp meadows, and on the margin of ponds, &c. throughout England and the south of Scotland during the summer months. Taken plentifully about Edinburgh. "Chelsea," *Rev. A. Badger.* It is probably distributed over the whole island.

7. ODONTOMYIA TIGRINA.

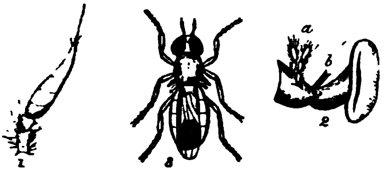
Musca tigrina, *Gmelin,*—Stratiomys tigrina, *Fabr. Meig. Panzer, Faun. Germ.* lviii. fig. 20.—Odontomyia tigrina, *Latr. Stephens.*

Head and antennæ black, the hypostome in the female with grey hairs; eyes with a purple fascia; thorax black, with pubescence of the same colour in the male, but the pubescence in the female yellowish, inclining to green when seen in certain lights; abdomen entirely black above, rufous beneath, the under side of the female widely margined with black; legs ferruginous, the thighs nearly all brown, and the tibiæ having a patch of that colour towards the middle. 3½–4 lines.

Has been taken near London and elsewhere, but appears to be rare.

GENUS CLITELLARIA, *Meig.*

Antennæ about the length of the head, the two first joints nearly equal, short and somewhat cup-shaped, the third thicker and conical, five-ringed, and terminating in a two-jointed style, (Fig. 1;)



labrum short and horny, placed at the base of the labium, the apex notched (Fig. 2, *b* ;) palpi triarticulate, the third joint ovate, pubescent, (Fig. 2. *a* ;) scutellum semicircular, armed with two spines.

The genus Clitellaria of Meigen corresponds to that named Ephippium by Latreille. The former of these authors includes in it the *Nemotelus villosus* of Fabr. and two other species which are destitute of spines both on the thorax and scutellum, besides differing in some other particulars from the insect described below. As it seems improper to associate species so dissimilar in structure, the genus has been defined above, so as to restrict its application to the kinds provided with a spinous scutellum, all of which, with a single exception, are exotic. The name used by Latreille may be applied to the others.

1. CLITELLARIA EPHIPPIUM.

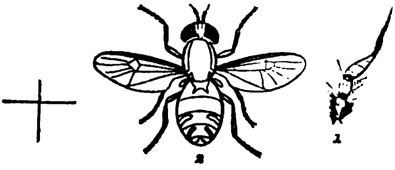
Musca ephippium, *Gmelin, Donovan,* xvi. pl. 559.—Stratiomys ephippium, *Fabr.*—Ephippium thoracicum, *Latr. Gen.* iv. 276.—Clit. Ephippium, *Meig. Zwei.* iii. 122, *Stephens, Catal.*

Head black, the female with two small white spots on the forehead; thorax clothed with silky pubescence of a bright-red colour, the breast and sides black; before the insertion of the wing on each side, there is a pretty long projecting spine; scutellum and its two spines, likewise the abdomen and legs black; halteres yellow; wings reddish-brown. 4½–5 lines. *(See Fig. 3 of the above cut.)*

This insect is apparently scarce in Britain, but it is sometimes found near London. "Coombe Wood by George Milne, Esq.—Kent," —*Donovan, l. c.*

GENUS OXYCERA, *Meig.*

Antennæ rather shorter than the head, approximating at the base, but diverging anteriorly, the two first joints nearly equal, subcylindrical, somewhat widened at the apex, and pilose, the third as long as both the others, tapering to the extremity, and divided into four rings, the apex with a two-jointed style, generally inserted on the back just before the summit, (Fig.



1;) thorax and abdomen oval, the latter somewhat convex; scutellum with two posterior spines: eyes slightly pubescent in the males.

This genus approximates pretty closely to *Clitellaria*, but is sufficiently distinct. The species, which are not numerous, are all of small size, some of those found on the continent being even very minute: and they are prettily coloured, with the abdomen generally fasciated or spotted at the sides with yellow. They frequent flowers and foliage, usually in the vicinity of ponds and other collections of water. The larvæ seem to be unknown.

1. OXYCERA PULCHELLA.

Meig. *Zwei.* iii. 125, pl. 25, fig. 29, ♀. Musca hypoleon, *Donovan*, v. pl. 146. fig. 2.—Musca tardigradus, *Harris, Expos.* pl. xi. fig. 6.

Head and antennæ black, the forehead with two silvery pubescent spots in the male, yellow in the female, with a black line in the middle; the hypostome and space behind the eyes likewise yellow in the latter sex; eyes with a purple band: thorax black, margined on the sides with yellow from the front to a little behind the base of the wing, beyond this a triangular yellow spot on each side of the scutellum; the latter yellow, the spines tipped with black; abdomen black, with a pretty large oblique yellow spot on each side of the third and fourth segments, and a triangular one at the extremity; in addition to these, the female has a yellow mark on the first segment, just below the scutellum; under side of the abdomen black, the second, third, and fourth segments more or less yellow in the middle; legs yellow, upper half of the thighs black, and the terminal joints of the tarsi likewise of that colour. About 3 lines in length. (*Preceding wood-cut, fig.* 2.)

Battersea Fields and other places in the vicinity of London. "Near Portland, on 24th June 1831."—*J. C. Dale, Esq.*

2. OXYCERA TRILINEATA.

Stratiomys trilineata, *Fabr.*—Musca trilineata, *Linn.*; *Donovan*, v. pl. 151. fig. 5.—Musca Hydroleon, *Harris, Expos.* pl. xi. fig. 4.

Nearly of the same size as the preceding, the prevailing hue green, or yellowish-green, the one colour sometimes predominating and sometimes the other; antennæ yellow, the forehead of the female with three black streaks, the lateral ones abbreviated; thorax with three black longitudinal lines approximating, sometimes confluent, at both ends; scutellum with its spines of the same colour as the body; abdomen with irregular transverse black bands on the back, not reaching the margin, and frequently having the ends turned forwards so as to give them a crescent shape; legs and halteres yellow; wings vitreous.

Apparently a scarce insect, but found occasionally near London and in other parts of England. " Cardew Mire".—*T. C. Heysham, Esq.* " Marshes, Ireland, common."—*A. H. Haliday, Esq.*

3. Oxycera muscaria.

Stratiomys muscaria, *Fabr. Panzer, Fauna Germ.* cviii. 15 ♂, 16 ♀.—Meig. *Zwei.* iii. 125.

Head black, the forehead, crown, and hinder margin of the eyes yellow in the female; thorax in the male shining black, with an interrupted lateral stripe of yellow, and a spot of the same colour beneath the insertion of the wing; in the female yellow, with three black longitudinal lines, and a small black spot at the base of the wings; scutellum and spines wholly yellow; abdomen black and shining, with triangular yellow marks on the sides, nearly semicircular in the female, which are united at the margin; anus yellow; under side of the abdomen black, the incisures and the outer margin edged with yellow; halteres and legs of the latter colour; the wings nearly hyaline, with yellowish-brown nervures. 2 lines.

Probably a scarce species in Britain; it occurs near London: but very few British localities have hitherto been cited for it. It is pretty widely distributed over the continent of Europe.

4. Oxycera formosa.

Meig. *Zwei.* iii. 127.

Nearly of the same size as the preceding; shining black, the forehead of the females yellow at the sides; thorax black, with the sides yellow, that of the females with two additional yellow lines united in front to the marginal stripe; scutellum with its two spines pale-yellow; abdomen black, that of the male with two lateral yellow spots, that of the female with three; the anus likewise yellow. 2 lines.

Not having seen examples of this and the two following species, recourse has been had for their distinctive characters to the descriptions of continental naturalists. The only notice which we have seen of their occurrence in Britain, occurs in a communication by Mr Dale to Loudon's Magazine of Nat. History, and wishing that no species recorded as indigenous should be omitted in these descriptive notices, they are accordingly inserted on his authority. The insect above described was found at Mullet's Copse, near Glanville's Wootton.

5. Oxycera terminata.

Megerle; Meig. *Zwei.* iii. 130.

Head shining black, base of the antennae ferruginous; forehead with a white spot before the ocelli; thorax with a lateral line of sulphur-yellow on each side extending to the base of the wings; scutellum and spines sulphur-yellow; anus with a semicircular pale-yellow spot; halteres whitish; legs reddish-yellow, the hinder thighs brownish before the apex. 2½ lines.

"Glanville's Wootton."—*J. C. Dale, Esq.*

6. OXYCERA ANALIS.

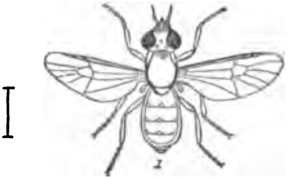
Meig. iii. 130; Megerle.

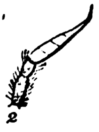
Somewhat larger than the preceding, to which it is very similar: antennæ entirely black; thorax with a yellow lateral line, the scutellum and a mark above the anus of the same colour; wings with a fuscous spot; thighs entirely black, except a small portion at the apex, the hinder tibiæ marked with a dark-brown spot. 2⅔ lines.

"Mullet's Copse; Glanville's Wootton."—*J. C. Dale, Esq.*

GENUS NEMOTELUS, *Geoff.*

Antennæ nearly as in *Oxycera*, the two first joints being almost equal, the third elongate, divided into four rings, and having a short two-jointed style at the extremity, (Fig. 2;) inserted at the apex of a conical hypostome projecting in the form of a beak, and covering the proboscis, which is long, slender, geniculated and without distinct lobes; labrum long, narrow, and pointed; palpi very minute, if they exist at all; thorax subquadrate; abdomen oval, scarcely wider than the head; scutellum unarmed; halteres uncovered.


1


2

The short conical beak readily distinguishes this genus from others of the family. The species are rather of small size, few in number, and frequent marshy places; the larvæ probably inhabiting stagnant pools. As in most of the allied genera, the sexes are distinguished by the size of the eyes, those of the male being large, and meeting at their inner edges, while in the female they are smaller, and separated from each other by a considerable space.

1. NEMOTELUS ULIGINOSUS. (S.)

Musca uliginosa, *Linn.*; *Donovan*, xv. pl. 519. Nemotelus uliginosus, *Fabr.*; *Meig. Zwei.* iii. 114, pl. 25, fig. 19, ♀.

Head black, with a white spot over the antennæ in the male, which assumes the form of an interrupted white line in the female; thorax shining black, with fine grey pubescence, having a white lateral line on each side extending from the shoulder to the insertion of the wing; scutellum concolorous with the thorax; abdomen of the male white, with the base black and a spot of that colour at the apex; that of the female black margined with white, having a row of small white triangular marks down the middle, and another on each side; the spots of the latter united to the white margin: thighs black with the apex white, all the rest of the leg of the latter colour, except the hinder tibiæ, which are black in the middle; wings vitreous, the costal nervures yellowish. 3 —3¼ lines.—(*Wood-cut, Fig.* 1*st.* ♀)

Found occasionally on flowers in marshes and damp meadows from May to August, probably inhabiting most parts of the country. "On Umbelliferæ, common in Ireland."—*A. H. Haliday, Esq.*

2. NEMOTELUS PANTHERINUS.

Musca pantherina, *Linn.*—Nemotelus marginatus, *Fabr.*—Nemotelus pantherinus, *Meig. Zwei.* iii. 115, pl. 25, fig. 20, ♂.

Very closely resembles the preceding in its general appearance, but is considerably less, seldom exceeding 2 or 2¼ lines. Head of the female without any white mark over the base of the antennæ; thorax pubescent, of a uniform black colour without any white marks; abdomen of the male white, with a black spot just before the apex; that of the female black, with a single dorsal series of small white spots: thighs black, white at the apex; tibiæ white, with a brown mark before the apex; tarsi entirely white. 2—2¼ lines.

Found with the preceding, but less frequently. "Near London," *Stephens's Catal.* "Cambridge," *Charles C. Babington, Esq.*

3. NEMOTELUS NIGRINUS.

Nemotelus nigritus, *Panzer, Fauna Germ.* cvii. 17.—Nem. nigrinus, Fallen, *Diptera Suecicæ.*—Meig. *Zwei.* iii. 117.

Considerably less than either of the preceding; head shining black, antennæ brown; thorax with a yellow humeral dot, from which a yellow line extends to the base of the wings; the other parts of the thorax and the whole of the abdomen shining black in both sexes; halteres and legs white, slightly tinged with yellow; thighs black, except at the apex; anterior tibiæ tinged with brown, the hinder pair nearly black. 1½—2 lines.

This likewise has occurred in the vicinity of London and in a few other places. "Bog of Allen; Connemara; Holywood," *A. H. Haliday, Esq.*

4. NEMOTELUS BREVIROSTRIS.

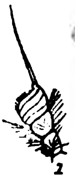
Meig. *Zwei.* iii. 117.

The most distinctive mark in this small species is in the form of the rostrum, which is very short and truncated; the prevailing colour of the body shining black, the antennæ brownish, and an interrupted white line above their base; thorax with a dilated abbreviated yellowish-white line on both sides; abdomen with a posterior whitish triangle on the second segment, a semicircular dorsal spot on the fourth, and a transverse white line at the extremity; legs yellowish-white, the thighs and hinder tibiæ black, with the apex yellow. 1½ lines.

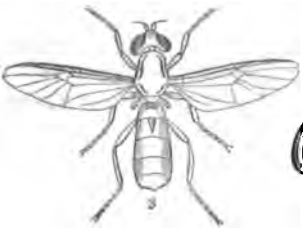
Rare; inhabits some parts of Middlesex, but no other British localities have hitherto been given for it.

GENUS SARGUS, *Fabr.*

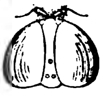
Antennæ very short, placed close together at the base, inclining sidewise, the radical joint subovate and truncate, pilose, the second cup-shaped and likewise pilose, the third nearly orbicular, divided into four rings, one of them very indistinct, and having a long naked seta attached to the upper side, (Fig. 1;) palpi wanting; labium large, fleshy and bilobed; the labrum short, and notched at the apex; maxillæ slender and acute, about the length of the labrum; eyes somewhat remote in both sexes; ocelli placed on the forehead, the anterior one generally somewhat remote from the others, (Fig. 2;) thorax with a cross suture most distinctly marked at the sides; abdomen flat, narrow, and much elongated in the male, shorter and wider in the female; scutellum semicircular, without spines; halteres rather long, subtrigonate; winglets wanting; basal joint of the tarsi as long as all the other joints taken together.



1



3



2

The flies included in this genus are insects of great beauty, being of very elegant forms, and ornamented with brilliant metallic colours. They are rather inactive in their habits, delighting to repose on the foliage of plants, particularly the glossy leaves of the laurel and other evergreens, during warm and sunny weather. They are seldom noticed on flowers, and several of the larger kinds shew no preference to marshy situations, like so many others of the same family, but frequent gardens, shrubberies, skirts of woods, &c.

They probably derive their nourishment from the saccharine juices which frequently exude from the leaves of plants. We are still imperfectly acquainted with their larvæ. One described by Reaumur was found to live in cow-dung. It was of an oblong figure, narrowing to a point anteriorly, and furnished with two hooks at the head, which is of a scaly texture. Its metamorphosis took place within the skin of the larva, and the fly made its exit by pushing outwards the portion that covered the head and first segment. *

1. Sargus cuprarius, (s.)

Musca cupraria, *Linn. Fabr.*—Nemotelus cuprarius, *De Geer*, vi. 200, tab. 12, fig. 4.—Sargus cuprarius, *Fabr. Syst. Ant.*

Forehead bluish-black, shining and pubescent, narrow in the males, somewhat wider in the females; antennæ brown, with a small white spot over the base of each; eyes brassy green during life, with a horizontal purple band a little above the middle, the superior space more or less inclining to that colour, particularly behind; thorax shining golden-green, pubescent, the sides blue-black; halteres pale yellow, or whitish; wings vitreous at the base, more or less clouded with brown in the middle, especially from the anterior margin across the discoidal cell; abdomen cupreous, shining and pubescent, the hinder parts more or less glossed with violet, the whole being of the latter colour in the female except at the base; the under side shining black inclining to blue; legs black, the tip of the thigh, base of the tibiæ, and some of the joints of the tarsi inclining to reddish-yellow. 4–5 lines.

This beautiful insect is found from May till August, and seems to be not uncommon in most parts of the country. It frequents gardens, shrubberies, and sheltered lanes, and is not observed much on the wing, but reposing on the foliage, as if enjoying the sunshine. It has been noticed in many parts of Scotland, and it is sometimes rather plentiful in the Botanic Garden of Edinburgh, and other places near the Scottish metropolis. The female is always much more plentiful than the male. "I found this splendid insect in abundance on the borders of a wood near Dover, on the 14th of July, and took a female in Scotland the same month."—*Curtis, B. E.* vii. fol. 305. "Near London," *Stephens*. "Dunkeld and Dumfries-shire," *Sir William Jardine, Bart.* "Woods near Newby Cross, in the vicinity of Carlisle," *T. C. Heysham, Esq.* "Bath," *Charles C. Babington, Esq.* "Twizell," *P. J. Selby, Esq.* "Common in Ireland," *A. H. Haliday, Esq.*

---

* Reaumur, *Memoires pour l'Histoire des Insectes*, iv. 348.—It is difficult to determine from his rude figure, (pl. 22, fig. 7–8,) what species of Sargus originated from this larva; it cannot be *S. cuprarius*, as De Geer and Latreille suppose, (*Regne Animal*, v. p. 487,) for the belly and legs are described as being pale yellow. Meigen conjectures that it is the species which has since been named *S. Reaumuri*.

2. SARGUS INFUSCATUS. (S.)

Meigen, *Zwei.* iii. 107.

Antennæ, head, eyes, and thorax as in the last; abdomen cupreous, glossed with violet behind, and entirely of the latter colour in the female, the base sometimes with a cupreous tinge: wings mostly suffused with dusky brown, the region of the stigma and discoidal cell darker than the rest, the base rather pale: legs obscurely fuscous. 4½–5 lines.

By no means a scarce insect throughout Britain, and so closely allied to the preceding that the respective species are not readily distinguished; indeed there is every reason to believe that this is a mere variety of *S. cuprarius.* It is not very rare in gardens near Edinburgh, and in Dumfries and Roxburghshires. "Raehills," *Rev. William Little.* "Beginning of June, roads and gardens near London," *Curtis, l. c.* "Near Twizell," *P. J. Selby, Esq.* "Woods near Newby Cross," *T. C. Heysham, Esq.* "Bath: Needwood Forest, Staffordshire," *Charles C. Babington, Esq.*

3. SARGUS NITIDUS.

Meig. *Zwei.* iii. 108.

Very closely resembling the two preceding insects in its general appearance, but differs in being considerably less, and in wanting the purple band across the eyes. The wings are dusky, but not so dark as in *S. infuscatus*, and the stigma is obsolete; in other respects it nearly agrees with the species just named. 3 lines.

Apparently rare; it has been taken, however, near London. "At Portland, 28th June," *J. C. Dale, Esq.*

4. SARGUS FLAVIPES. (S.)

Meig. *Zwei. Insecten*, iii. 108. pl. 25, fig. 14.

Hypostome and forehead deep glossy black, with a bluish tinge, and two minute whitish points over the base of the antennæ; the latter dark-brown: surface of the thorax and scutellum brilliant golden green, sometimes glossed with copper-colour, the breast and sides black, all these parts thinly covered with whitish pubescence; abdomen shining copper-colour above, more or less tinged with steel-blue towards the apex, especially in the female; the under side nearly black; halteres pale yellow; wings brownish yellow, darkest about the discoidal cell; legs yellow, the thighs, particularly the anterior pair, and frequently the extremity of the tarsi, slightly tinged with dusky. Length about 4 lines.

Not a very abundant species, but found occasionally throughout England and in the south of Scotland. In the vicinity of Edinburgh it has been taken at Duddingston, and in the Botanic Garden; likewise in Roxburghshire and East Lothian. "Near Dorchester," *J. C. Dale, Esq.* "Bath," *Charles C. Babington, Esq.* "Not rare in Ireland," *A. H. Haliday, Esq.*

5. SARGUS REAUMURI. (S.)

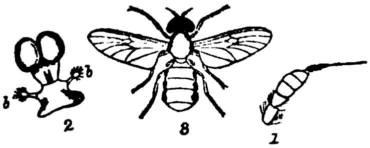
Fabr. *Syst. Antl.* 256.—Meig. *Zwei. Ins.* iii. 109.—Curtis, *Brit. Ent.* vii. 305. ♀

In this beautiful species there is a remarkable discrepancy in the appearance of the sexes, the female being conspicuously distinguished by having the base of the abdomen of a bright red; in both sexes the head and antennæ are blackish, the hypostome blue-black; two white spots over the base of the antennæ, the ocelli placed on the crown almost at equal distances from each other, the anterior one not being so remote as in any of the preceding species: thorax bright golden-green above, and bluish or greenish black beneath, each side with a whitish longitudinal line, separating the two colours: abdomen in the male long and narrow, of a uniform light copper-colour, clothed on the sides with rather long whitish hairs standing at right angles with the surface; in the female the two first segments red with a quadrate violaceous spot on the back of the first segment, and an elongate-ovate one on the second, the remaining segments shining steel blue, with ochreous pubescence: halteres and legs ochreous yellow, the tarsi blackish towards the tip: wings light brown, slightly iridescent, the nervures piceous. Length of the male 6 lines; of the female 4½–5. (*Woodcut, p.* 160, *fig.* 3. ♀)

Scarce, but occurring at times in many parts of the country. A considerable number of both sexes were once taken by Mr Duncan in an open and marshy part of a wood on the banks of the Tiviot, in the month of August, and others have been noticed in the vicinity of Edinburgh. "Rockcliff Moss, Cumberland, taken on 5th July by T. C. Heysham, Esq.; and I possess a specimen which was found, I believe, in Kent." *Curtis, B. E.* vii. fol. 305. "Braid Hills, near Edinburgh," *Dr Stark.* "Jedburgh," *Rev. William Little.* "Holmes, Roxburghsire," *Sir William Jardine, Bart.* "Twizell, occasional," *P. J. Selby, Esq.*

Genus CHLOROMYIA, *Nob.*

Antennæ rather short, the two first joints nearly as in *Sargus*, the third ovate or elliptical, with the rings rather distinctly marked, the seta pubescent at the base; (Fig. 1,) palpi two, three-jointed, the first joint short and cylindrical, the second likewise cylindrical, but slender, the third globular and pubescent, (Fig. 2. *b.*) Maxillæ very minute, or wanting: eyes united in the male; ocelli placed near each other on the crown: abdomen not much elongated and rather wide; scutellum and halteres as in *Sargus*.



The distinctive characters of the insects included in the present genus were first accurately pointed out by Meigen, although he improperly allowed them to remain as a sectional division of Sargus. The same plan was followed by Macquart, but the differences between the two are far too important to allow this connection to be maintained with propriety. In colouring and aspect, these flies are not unlike the Sargi, but they differ somewhat in their habits, and are much more frequently found on flowers. The species first described differs from the others in having the eyes pubescent, and the terminal joint of the antennæ considerably elongated; that articulation in C. polita and C. flavicornis inclining more to an orbicular shape, as among the true Sargi.

1. Chloromyia formosa. (S.)

Shrank, Meig. *Zwei.* iii. 110. Musca aurata, *Fabr. Donovan*, iv. pl. 142. fig. 1. Nemotelus flavogeniculatus, De Geer, vi. 81. Sargus xanthopterus, *Fallen, Latr.*—Sargus auratus, Fabr. *Syst. Ant.* 257. 4. Musca Cicur, *Harris, Expos.* pl. xi. figs. 8, 8, (left hand fig. ♂, right hand ♀.)

Hypostome shining black, with rather long ochreous pubescence; eyes likewise pubescent, greenish during life, with a purple band; antennæ brownish-black: thorax shining golden-green, sometimes glossed with violet in the female, covered throughout with rather long ochreous hairs; abdomen of the male bright brassy or golden-yellow, that of the female strongly tinted with violet blue, changing according to the direction of the light, in both sexes clothed with ferruginous hairs, which are longest in the male, and seen most distinctly when viewed from the head; under side of the body and sides of the breast black, shining, and rather sparingly pubescent; the belly of the female bluish; legs brownish-black, the apex of the thighs and base of the tibiæ reddish-yellow; halteres pale yellow; wings of a uniform yellowish-brown, with the nervures darker. 3½ to 4 lines. (*Preceding wood-cut, fig. 8.*)

A beautiful and very distinct species, occurring rather plentifully on flowers in meadows and marshes, during the months of June, July, and August. Near Edinburgh it is found in many situations, and occasionally in great abundance on the irrigated meadows between Portobello and Leith. "Near London," *Stephens's Catal.* "Raehills, Dumfries-shire," *Rev. William Little.* "Holmes, Roxburghshire," *Sir William Jardine, Bart.* "Woods near Newby Cross," *T. C. Heysham, Esq.* "Bath," *Charles C. Babington, Esq.* "Common in Cruciferæ, in Ireland," *A. H. Haliday, Esq.*

2. CHLOROMYIA POLITA. (S.)

Musca polita, *Linn.* Sargus politus, *Fabr. Syst. Ant.*; *Meig. Zwei.* iii. 111. Nemotelus auratus, *De Geer*, vi. 81. Musca vitreus, *Harris, Expos.* xi. fig. 9 and 10, ♂.

Colour of the body golden green, the surface highly polished and shining, the pubescence being so short and scattered as to be scarcely perceptible; eyes brassy-green, without pubescence; antennæ dark-brown; forehead of the female shining green, sometimes inclining to blue; abdomen slightly tinged with copper-colour, and having a violaceous play of colour in the female; under side of the body black, the legs yellow with the thighs black, except at the apex, the hinder and sometimes the intermediate tibiæ brownish near the apex; halteres pale yellow; wings vitreous, very slightly tinted with yellow, iridescent, the nervures brown. 1¾–2 lines.

Rather a common fly throughout the south of Scotland during the summer months, and apparently equally plentiful in England. "Near London," *Stephens's Catalogue.* "Isle of Wight and London," *Curtis, B. E.* vii. fol. 305. "Neighbourhood of Twizell," *P. J. Selby, Esq.* "Woods near Newbigging Hall," *T. C. Heysham, Esq.* "Needwood Forest, Staffordshire," *C. C. Babington, Esq.* "Common in hedges in Ireland," *A. H. Haliday, Esq.*

3. CHLOROMYIA FLAVICORNIS. (S.)

Meig. *Zwei.* iii. 112.

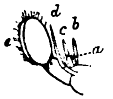
About the size of *C. polita*; antennæ yellow; thorax shining golden-green, glossed with blue posteriorly; abdomen yellowish, with a blue play of colour; legs pale-yellow, the hinder thighs black, with the base and apex yellow, the hinder tibiæ tinged with brown before the apex; halteres and wings as *C. polita.*

This species was first described by Meigen, from a specimen transmitted to him by Dr Leach, which was taken in England, probably in Devonshire, There seems reason to suppose that it is only a variety of C. polita, as that species evidently varies considerably, and in ordinary specimens the base of the antennæ are frequently yellow. In an example of *C. flavicornis* taken last summer in Roxburghshire, the legs are entirely pale-yellow, the hinder thighs scarcely tinged with brown. If carefully sought after it will probably be found not to be rare.

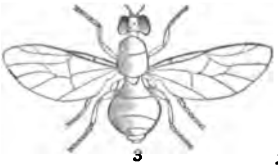
"Once taken at Dover," *Curtis, B. E.* vii. fol. 305. "Dumfriesshire," *Sir W. Jardine, Bart.* "Common in Ireland, along with *C. polita,*" *A. H. Haliday, Esq.*

Genus PACHYGASTER, *Meig.*

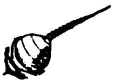
Antennæ small, approximating at the base, turned obliquely outwards anteriorly, the radical joint minute, the second larger and transverse, the third large and spherical, divided into four very indistinct rings, and having a slightly pubescent seta attached to the outer side near the extremity, (Fig. 1 ;) palpi inserted at the base of the maxillæ, very minute, (Fig. 2, *a* ;) labrum robust and cylindric, the apex obtuse and slightly notched, (Fig. 2, *b* ;) tongue about half the length of the labrum, horny, and attenuated from the base to the apex, (Fig. 2, *c* ;) maxilla long, slender, and acute, (Fig. 2, *d* ;) eyes approximating in the males; ocelli three; thorax with a transverse suture; scutellum without spines; abdomen much wider than the thorax, subglobose; halteres large and ovate.



2



3



1

This genus was constituted by Meigen, and is synonymous with that named *Vappo* by Fabricius and Latreille. It includes only two species, one of which does not appear to be known to continental naturalists. They are both minute insects, of obscure colours, and frequent woods and gardens. The larva of *P. ater* is described by Macquart as elongated, of a reddish-grey colour, and marked with three obscure longitudinal bands.

1. Pachygaster ater.

Vappo ater, *Fabr. Latr.* Sargus pachygaster, *Fallen.* Nemotelus ater, *Panzer*, liv. fig. 5; Meig. *Zwei.* iii. 102, pl. 24, fig. 17.

Body black, smooth and shining, marked with minute punctures;

ish in the male, ferruginous in the female, the seta
le-yellow; eyes dark-green, the forehead of the
h play of colour; the abdomen is convex above,
side, the incisures very faintly marked; legs
black; halteres with the knob dark-brown,
with the lower half brown, the upper half
ut, fig. 3.)

ually found in July and August in
frequent in woods near London, and
r parts of England. "Cambridge;
gton, Esq.

2. PACHYGASTER LEACHII.

Stephens's *Cat.*—Curtis, B. E. i. pl. 42.

dy black and shining, minutely punctured; antennæ reddish, (in the female,) the eyes likewise inclining to that colour during life; legs pale-yellow, the hinder thighs with a small black spot near the apex; halteres brownish; wings entirely hyaline, with pale-brown nervures. 1½ lines.

First discovered in Devonshire by Dr Leach, and subsequently taken in the same county by Mr Curtis, but it appears to be rather a rare species. "Near Wareham Harbour, Dorset," *J. C. Dale, Esq.* "Madingley Wood, near Cambridge, in July," *Charles C. Babington, Esq.*

VI.—*Notice of the Lutjanus rupestris of Bloch.* By P. J. SELBY, Esq. F. R. S. E., &c. Pl. VI.

AFTER the reflux of the extraordinary high tide, so severely felt along the whole of the eastern coast of the island, on the 20th of February 1836, produced by the concurrent effects of a long-continued southern gale and a spring tide, numbers of fish of different kinds, evidences of the convulsed and unusually agitated state of the ocean, were, with other matters, thrown dead upon the shore far beyond the usual line of high water-mark. The species which suffered most upon the northern parts of the Northumberland and Berwickshire coasts, so far as I have been able to ascertain, belonged to the *Labridæ* (Wrasses) which may be attributed to the habits of the group, most of which affect a hard or rocky bottomed sea, though I am informed that in some parts where a sandy bay or soft bottom occurred, soles and other flat fish were also thrown out in considerable numbers. The species noticed, mostly belonged to the *Labrus maculatus*, Yarrell, (Ballan Wrasse,) but three specimens of a different kind were fortunately preserved, two of which, picked up in Berwick Bay, were secured by Dr Johnston, the third found near Barncleugh, was sent to me, a day or two after the event which cast them on shore. Upon consulting different ichthyological writers, these fish appear to be identical with Jago's *Goldsinny*, as figured and described in Ray's Synopsis Av. et Pisc. App. p. 163, fig. 3, where the rude engraving accurately expresses the specific markings of the species; and with Bloch's *Lutjanus rupestris*, whose detailed description and figure also agree in every respect with the specimens in question. It does not appear, however, to be the Goldsinny of Pennant and subsequent writers, who under that name have figured and described a different species. This error seems to have originated with Pennant, who having never seen or examined the true Goldsinny of Jago, has incorporated in his slight notice of that fish the description of another species, to which his figure refers. Bloch seems to have entertained this opinion, for although he has quoted Pennant's Goldsinny as a synonym of his *Lutj. rupestris*, supposing it to refer to Jago's fish, he afterwards, in the last paragraph of his description, remarks, that the fish described and figured by Pennant could scarcely be the same as the Goldsinny of Jago, or his *Lut. rupestris*, as it differed from it in figure, peculiar markings, and in the number of the hard rays of the dorsal fin. The true Goldsinny seems to have escaped the notice of subsequent writers, as the figures and descriptions we possess are all referable to the other species, distinguished by a black or dark spot at the base of the caudal fin, but always situated upon or rather below the lateral line, and not upon the upper edge of the base of the tail, as in the true Goldsinny of Jago; it also wants the black patch upon the anterior portion or rays of the dorsal fin; both of which specific characters are accurately displayed in Bloch's figure, as well as in the less finished engraving in Ray's Synopsis.

Mr Yarrell, to whom a specimen has been submitted, considers it as distinct from any of the species described in his beautiful work on the British fishes, though he thinks, and we agree with him, that the small figure constituting the vignette to page 301, is perhaps referable to it rather than to the *Scale-rayed Wrasse*, the young of which it was supposed to be by M. Couch, but to which it bears very little resemblance. In that figure, taken from a specimen about three inches in length, the black spot at the upper part of the base of the caudal fin is expressed, but no indication of the other at the anterior part of the dorsal fin: in shape it agrees pretty well with my specimen. With

Crenilabrus luscus, the Labrus luscus of Couch's fishes of Cornwall, described and figured in the fifth volume of Loudon'sMagazine of Nat. Hist. (Scale-rayed Wrasse, Yarr.) it cannot well be confounded, the proportions of the bodies of the two fish being very different, and the formula of the fin rays dissimilar. The corkwing of that able ichthyologist is evidently, from the wood-cut given, the same as the Goldsinny of M. Yarrell, who indeed quotes it as a synonym, and M. Jenyns's *Labrus Cornubicus*, in the manual of Br. Vert. Animals, is descriptive of the same fish, and not of the Goldsinny of Jago, although Ray's authority is quoted first. In its general form it approaches nearest to the *Crenilabrus tinca,* Yarr. (Gilthead,) but this fish is destitute of the two black spots, so conspicuous in the other; the number of the fin rays is also different, and the margins of the preopercle in the Gilthead are more strongly denticulated. The following is a description of the specimen in my possession, with a correct outline engraving of the natural size.

Description. Length, six inches and three-quarters. — General form resembling that of *Crenilabrus tinca.* Length of head alone, to head and body without the caudal rays, as one to three. Greatest depth of the body, exclusive of fin, about two inches, or rather more than a third of the length of the body. Thickness contained about twice and a-half in the depth. Dorsal line rounded, falling regularly, and continuous with the profile, with little or no depression at the nape. Jaws equal, teeth prominent, the anterior middle ones rather large, their tops bending inwards, about eighteen above, and twenty below; a second row of smaller ones behind in each jaw. Eyes rather large, placed high up near to the line of profile. Preopercle scaled, the ascending line strait, and finely denticulated, the under line slightly rounded. Opercle smooth, slightly sinuated below, emarginate above. Forehead smooth, lateral line following the contour of the body till it approaches the base of the dorsal fin, where it suddenly bends down, and is then continued in a strait line to the middle of the base of the caudal fin. The scales large, and thirty-five or thirty-six in number longitudinally. Dorsal and pectoral fins commencing upon the same line. Soft rays of the dorsal fin ending a little beyond the line of the terminating rays of the anal fin. Spiny rays of the dorsal rather short and nearly all of the same length, the soft rays longer and rounded. Pectoral fins large, rounded. Ventral fins with an elongated scale between them. The number of fin rays.

D. 18+9. P. 14. V. 1+5. A. 3+8. C. 15 and 2 short.

Colour. The general colour of the specimen I received when first found, was described as being of a rich pink or rose-colour, intermixed upon the sides with golden yellow, and showing indications of darker transverse bands upon the back; upon the opercle a spot of blue, continued towards the eye; fins rosy pink mixed with yellow. Upon the anterior part of the dorsal fin a deep black spot or blotch, occupying the greater part of the membranes of the three first rays; another upon the upper margin of the base of the caudal fin. These spots were similar in size and situation in Dr Johnston's specimens, and they continue unaltered in the spirits, although the other colours have faded to a pinkish brown.

As the specific title of Cornubicus has been applied to the other species, and described as the Goldsinny by various writers subsequent to Pennant, it is proposed to designate the present species as the *Labrus (Crenilabrus) rupestris,* (Jago's Goldsinny,) to which the following synonyms may be appended.

Goldsinny, Ray's Syn. Av. et Pisc. App. Catalogus quorundum rariorum, &c. D. Georgius Jago, p. 163. f. 3.

Die Seekarausche, Lutjanus rupestris, Bloch. Naturg. der Ausländischen fische, ii. p. 117, pl. 250, fig. 1.

VII.—*Observations on some circumstances attending the process of Exuviation in Shrimps and Lobsters.* By JONATHAN COUCH, F. L. S.

Dr MILNE-EDWARDS, in his Histoire Naturelle des Crustaces, has given an account of what may be considered the present state of our knowledge, of the circumstances under which the process of exuviation is effected, and the methods by which it is accomplished in the long-tailed stalk-eyed crustaceans; but as much of what that eminent naturalist advances is derived from other authorities, and I have reason to conclude, contrary to the general opinion, that the circumstances attending this process of nature, are different in even nearly allied species, there still remains space for enquiry.

Réaumur is our only original authority for the minute circumstances attending the process of exuviation, which he observed in the River Crayfish (Potamobius fluviatilis, Leach;) but not having an opportunity of consulting that author's work, I copy his narrative from Dr M. Edwards's quotation: "A few days previous to the commencement of the operation, the creature abstains from all solid nourishment, and the carapace and abdominal segments will be found to offer less than the usual resistance to the pressure of the finger. Shortly afterwards the crayfish appears restless, and rubs its legs against each other; it then throws itself on its back, agitates its whole body and then distends it, by which the membrane joining the carapace to the abdomen is burst, and this great dorsal plate is raised. Some degree of rest follows these first struggles; but after a short time the animal again puts all its organs in motion, the carapace is seen to rise gradually from the legs beneath, and in less than half an hour, the animal has extricated itself from this portion of its slough. By retracting its head, the antennæ, eyes, and legs are withdrawn as from a case; and the extrication of the last, being the most difficult and complicated operation, is attended with so much pain, that the effort sometimes occasions the loss of one or more of the organs. The hinder parts are withdrawn with less difficulty; the head is conducted below the carapace, and the tail being thrown off by a forward motion attended with a brisk and distensive action, the creature is seen divested of all its encumbrances, and the case is left unbroken, as if no struggle had ever taken place within it.

I have no doubt that the process here described in the Cray-fish corresponds to what takes place in the common prawn (Palæmon serratus, Leach,) although I have never been able to observe it in operation;—the following is a description of the case from which the animal has recently extricated itself: The whole is thin, elastic and transparent; the carapace with its serrated process whole, the antennæ perfect to their minute extremities: the palpi and jaws drawn within the cavity of the thorax, and partially separated from the sternal plate; the latter with the legs still forming a loose attachment to each other, and without fracture, but drawn somewhat posteriorly into the thoracic cavity. The case and pedestal of one eye were within the thorax, but the other could not be found;—the legs perfect, and attached to the sternal plate. The caudal plates were united at their joints, but in no part was there any intervening membrane, this portion of the body not appearing to be thrown off with the more solid covering: a circumstance which will account for the fact, that the eyes do not long remain attached to the adjacent parts after the slough is left by its inhabitant.

The habits of the Lobster (Astacus Europeus, Leach,) at this periodical crisis, and the circumstances attending it, present a very considerable difference from those of the species already mentioned. So far from abstaining from food, it is not uncommon for it to be taken in crab pots, which it has been enticed to enter by the allurement of the usual bait; and instances have been related to me, where, when the fisherman commenced to handle his capture, the animal has slipped away, leaving an empty husk as the only reward of his labour. It was by a circumstance somewhat similar that the opportunity is afforded me of giving a minute description of a very perfect case, left by the creature when it made its escape:—for escape it did, through an aperture too narrow to have allowed it to pass if its new covering had possessed a very moderate degree of firmness—to the no small annoyance of the fisherman, who had calculated on the possession of a prize somewhat above the ordinary magnitude. I cannot find that any extraordinary actions or contortions have been observed in the lobster, when engaged in delivering itself from its trammels, or that the time is prolonged, as is the case with the crayfish: circumstances which are easily accounted for by an examination of the crust; and it is certain that when delivered it possesses great activity in effecting its escape, and that neither the prawn nor the lobster devour, as has been supposed, any portion of the old shell.

In the specimen referred to, the case of the antennæ and palpi, was perfect to their minutest extremities; the stalk also, and transparent covering of the eyes, were uninjured, but the former was attached on its inferior portion only, the superior half hanging loose, so that it would soon have fallen away in the agitation of the sea. The segments and joints of the posterior portion of the body, with the caudal plates, were all joined together, but without any intervening membrane; and the inferior parts from beneath the snout, including the jaws and footjaws, chelædlegs, with the sternal plate, oesophagus and internal coat of the stomach, formed one connected portion, with no farther separation than arises from the absence of every portion of membrane. The whole of these inferior portions was drawn very considerably within the carapace; and it was the latter section of the surface only that showed a mark of the manner in which the animal had delivered itself from its case; and this it did in a way not to be mistaken. Through the middle of this space, ran a line as straight as if it had been cut with a knife, and evidently formed by a natural process of separation: for it even proceeded through the centre of the snout, to the terminal pointed process, at the root of which it turned off on the right side; so that the least effort of the animal was sufficient to afford it a passage.

The observation here made on a very perfect specimen that came into my possession by great accident, has been further confirmed by a careful examination, both of the living lobster, in which an obscure line is perceptible, where the natural separation takes place; and also of a specimen of small size, in which the sloughing or natural process of division had only begun. In the latter case a deep channel had been formed on the external part, nearly half through the carapace; while the internal portion still remained firm; but

I have little doubt that if the creature had lived but a few days longer, the separation would have been complete, and the animal would have escaped from its prison.

The growth of the young of the long-tailed Crustaceans, is well known to be exceedingly rapid ; and there seems reason to believe that the process of exuviation is repeated at least two or three times in the course of the first year of their age. In the course of a summer, among many prawns one or two may always be found in a state that indicates the having lately passed through this process ; but about October or November they all seem to undergo it at once, the breeding season finishes, and no further change in the shell takes place until the approach of the spring. It is not improbable that the general opinion is correct, which limits the exuviation of the adult animals to once in the year ; but from the marks of old injuries, and the incrustation of parasitic animals, I have come to the conclusion that in advanced age the lobster does not throw off its case with any regularity, and perhaps not at all.

REVIEWS AND CRITICAL ANALYSIS.

I.—*De l'Histoire Naturelle des Cétacés, ou Recueil et Examen des faits dont se compose l'Histoire Naturelle des ces Animaux.* Par M. F. Cuvier, de l'Académie des Sciences, de la Societé Roy. de Londres, &c. 8vo. Avec Planches xxiv. Pp. lii. and 416. Paris, 1836.

We had for some time been anxiously waiting for the appearance of this work; and as, on perusal, we have been somewhat disappointed, we think it best at once to say so. Our disappointment, however, may, to a certain extent, be our own fault; for we have so long been accustomed to connect all that is most admirable and wonderful in natural history with the name of Cuvier, that our associations and expectations concerning every thing coming from one bearing that honoured name have probably been too high. Another and more tangible cause of our disappointment has arisen from a misapprehension of the avowed object of the treatise, and as this may mislead others also, we take leave to point it out. The title does not bear that the work is a natural history of the Cetacea, but, in the words of our author, only a history of their natural history,—certainly quite a different, though a very important, subject. Not only is this clearly declared to be the ostensible object in the title-page, but the respected author takes early and frequent opportunity to press it upon the attention of his readers, "J'ai cru être utile à la science en retracant en quelque sort l'histoire de l'histoire naturelle de ces mammifères aquatiques," (xlix.); and again, "Bien loin d'avoir eu le project de donner l'histoire naturelle de cet ordre entier de mammifères, je n'ai pas même dû concevoir la pensée de donner l'histoire d'une seule de ses espèces." (iv.) Our author even goes further, the object of his introductory remarks being to prove, that the time has not yet arrived, when the natural history of the Cetacea can be judiciously or profitably undertaken.

It is no difficult matter to discover the circumstances which gave rise to this train of reflexion, and dictated these remarks. The subject is confessedly a difficult one, and has made less advance than many others in natural history; the real facts collected concerning the order are comparatively few, and the fictions and errors are peculiarly numerous, so that every one who would presecute the subject is soon taught, that in using the accumulated mass of materials the greatest caution is necessary, and that much must be rejected, and but little adopted. This in fact has been the course pursued by all those who have lately taken up the subject; the Baron Cuvier led the way in this most irksome but necessary task, and we may remark, that we know no portion of his labours which is more striking and successful than that in which he applied an enlightened criticism to the review of the alleged species of this order; had then his brother done nothing more than presented to the public, in a portable and cheap form this work, which occupies a half of the fifth ponderous 4to on the *Ossemens Fossiles,* he would have rendered a most essential service to the cause of Cetology; and had he systematically devoted his pen to the removal of the serious obstacles just alluded to, we should have been the first to appreciate and commend his labours.

But while M. F. Cuvier has most distinctly announced the nature and design of his work to be those which we have stated above in his own words, it is not possible to proceed far in the perusal of his volume without discovering, that he has soon entirely departed from his avowed purpose, and, for reasons which are not explained, has executed his work very much on the usual and common plan of such treatises on natural history. In fact, had we not been so distinctly and frequently advertised on the point, we should not have discovered that he had even contemplated making any difference between his plan and that of the other natural histories of the Cetacea which have appeared either in more remote or more modern times. Our author himself seems to be fully conscious that he has deviated from his proper design, and has thereby introduced a want of symmetry and unity which cannot be too much regretted. He states the work to be one " ou il devroit y avoir plus d'accord, plus d'ordre, et surtout plus d'unite." (p. 1.)

An acknowledgment such as this seems to have anticipated, and so far as we are concerned, it disarms criticism; and we should not perhaps have given the prominence we have done to the circumstance, had it not been necessary in the way of accounting for a very decided tone of criticism which pervades the work, and which will probably call for a vigorous defence from those living authors who have been assailed. There is, however, another feature of the work which this circumstance does not so readily explain, which may be characterized under the name of innovation, and which assuredly should not have been employed to the extent it has been, without some very urgent and pressing necessity. In many particulars, indeed, M. Cuvier manifests a becoming respect towards the decisions of his illustrious brother, but in not a few instances he treats his opinions with as little ceremony as he does those of others, and rejects his proposals, and substitutes other views, which of course he regards as preferable. Thus, whilst he follows the new and admirable arrangement of the Baron with regard to the herbivorous Cetacea, and to the great whales, he very much forsakes and opposes him, and so innovates, in reference to that very numerous group which is intermediate between these two extremes. There can be little doubt that this is now the most perplexed and difficult part of the subject, and in illustration of the statement just made, and still more, as bearing very essentially on the future progress of the science, we judge it right to dwell somewhat more at large on the point.

Most of our readers are probably aware that some progress has been made in classifying these unnumbered, not to say innumerable species of smaller Cetacea. In the time of Bonnaterre, not fifty years ago, the genus Delphinus contained only nine species, but since that period this number has so much augmented, and is still so rapidly increasing, that it has long been felt necessary to break it up and subdivide it. It was the illustrious Lacépède who led the way in this division by the introduction of his *Delphinapterus,* including those which had no dorsal fin. Rafinesque Smaltz followed, by his discovering a species with two dorsal fins, which he named *oxypterus.* Baron Cuvier introduced a distinction founded upon what we may call the facial line of the living animal, thus separating the *Phocæna,* whose head and snout are uniformly curved to the extremity, from the *Delphinus,* which has a distinct fall or groove between the forehead and beak. Pursuing the same idea, Blainville introduced the *Delphinorhyncus,* which has a beak, which separates it from the phocenæ, and yet the beak not distinguished from the forehead, as in the dolphins, but on a uniform slope from the top of the head to the extreme point; and finally, Lesson has proposed to constitute the *Globiceps,* whose heads are almost wholly rounded like a globe, into a genus. Now these proposals have all, more or less, been adopted, and most of them, as the Delphinapterus, Delphinus, Delphinorhyncus, Phocæna, universally by later writers, such as Desmarest, Cuvier, Scoresby, Blainville, Lesson, &c. Another respectable individual who had adopted the majority of these subdivisions was M. F. Cuvier himself, who, in his Mammifères, for years has familiarly discoursed of Delphinapteri, Delphinorhynci, Phocænæ, &c. Being thus personally committed, and so many other respectable authors having long consigned works to futurity with these distinctions, we think nothing can be more apparent, than that the advance thus made should not on slight grounds have been abandoned. Our author, however, has so abandoned it, and this is the first of many innovations which he proposes. Thus, the Beluga or white whale, which for some sixty years has been universally ranked among the Delphinapteri, is no longer to be found in that genus; no more is it to be found among the dolphins, where it previously was, but, according to our author, it takes place among the porpoises.

The reasons which our author assigns for his innovations appear to us anything but satisfactory. After enumerating three of the sources whence generic characters have been drawn, *first*, the oldest one, the dental system, so useful in classification throughout the animal series; *secondly*, the organs of movement, proposed by Lacépède; and *thirdly*, what we have named the facial line, introduced by his brother,—"Mon frère y ajouta les formes de la tête de l'animal vivant, et en fit l'application aux dauphins dans la formation du groupe des marsouins,"—he assigns, as the only reason for setting these characters aside, that there are cases in which they are of no great moment, or are equivocal, or uncertain. In particular cases, and of the characters severally, this is true; but could M. F. Cuvier forget that this was probably as well known to his brother as to himself; and that still notwithstanding, these principles of classification were in part introduced, and were all distinctly stamped by the Baron's high authority.

The mode in which our author treats the genus Delphinorhyncus shows a contempt of authority, and a carelessness regarding classification and nomenclature, which astonished us not a little. He does retain the term Delphinorhyncus, and includes several species under it; but it is not the Delphinorhyncus which Blainville introduced, and which Desmarest, and Baron Cuvier, and M. F. Cuvier, and many others adopted; but it is quite a different Delphinorhyncus, based on a different ground,—not on the form of the head of the living animal, but on the form of the maxillary and intermaxillary bones of the dead,—a character, we may remark in passing, most obscure and objectionable. Regarding the established basis of the genus, described in his own words as "une tête sans front, où le bec est tout d'une venu avec la crâne," he hints that the substitution of the term *Cephalorhyncus* might be advisable, and remarks that such a ground of distinction and division may probably, on more accurate information, be necessary ! * Notwithstanding this proposal of a new generic name, he applies the term to an individual species,—to the *Delphinus cephalorhyncus ;*—to an animal which Baron Cuvier described as the Cape porpoise, and which he himself had both described and figured as the *Phocæna Capensis*. The inaccuracy and inconvenience of referring the same name to a species and a genus, as here proposed for the Cephalorhyncus, is too manifest, we apprehend, to require any elucidation; but this inaccuracy is only in keeping with our author's mode of treating the dolphins. Generally he discourses of them as the first great subdivision of the ordinary Cetacea, which he divides into seven genera, and then he applies the term, *par excellence*, to *one* of those genera which, in his view, comprehends somewhere between sixteen and forty-four species. We need not say that much confusion, which could easily be avoided, is hence the necessary consequence.

Another instance of the boldness of M. Cuvier's criticism occurs in his treatment of that group which Desmarest, Blainville, Lesson, and others, had recognized under the term *Heterodon*. This was not proposed as a generic term, but was employed to comprehend a number of genera which, though not very closely connected, yet, with other resemblances, had this feature in common, that their teeth were very heterogeneous, very few, and sometimes rudimental and apparently absent. Among other genera this group included the NARWHAL, the DIODON, the HYPEROODON, the AODON, and the ZIPHIUS, which Baron Cuvier regarded as entirely toothless. After a few words of criticism, our author rejects the Aodon altogether, and loses sight of, or entirely metamorphoses, three out of five of the genera we have just named.

We must not leave this part of the subject without making a few remarks on the author's *Delphinus Rostratus*. The " history of the natural history" of this species is somewhat curious, and very clearly illustrates the error and confusion, which, without the most scrupulous care and honesty, is sure to be introduced. This animal was first brought into notice, from imperfect data, in 1817, by Baron Cuvier, under the trivial name of *Dauphin à bec mince*,† and he attached to it the synonym of the *Rostratus of Shaw*. In 1823, (Oss. Fos.) he associated this *bec mince* with a specimen sent from Lisbon by M. Geoffroy, and to the two thus connected he gave the name *Frontatus*. Cuvier soon, however, discovered, from some specimens transmitted to him by M. Van Breda, a relative of the illustrious Camper, that these two were quite distinct; that the Rostratus of Shaw was the Gangeticus, and that the Frontatus, M. Geoffroy's specimen, had the dorsal fin of the same species.[*] In 1828, Mr Lesson gave an accurate account of Van Breda's specimen under the name of *Delphinorhyncus Bredanensis*, a name quite appropriate and unobjectionable. Next year, however, (loc. cit.) Cuvier refers to this species under the appellation of the *Rostratus*, which, according to another statement, in the same page, is the Gangeticus: he also distinctly places it among the Delphinorhynci. Again, our author, in 1833, states that his brother had named this new species Rostratus, referring in proof to the Oss. Fos. v. 400, where we find that no such name was given to it: at the same time he applies a new trivial name to it, *D. à long bec*. In the work before us he changes his ground, and adduces as proof that the Baron had named the species Rostratus, in the Règne Animal, 1817, where the Rostratus of Shaw alone is named. Finally, our author, who in 1833 had followed his brother, and had taken pains to show that this was a Delphinorhyncus,—"le museau de cet espèce montre assez quelle appartient à la division qu'on a plus particulierement designée Delphinorhynque,"—three years afterwards, in the work before us, excludes it from this genus, and ranks it as a Delphinus. It is assuredly not a little grievous, that when the great Cuvier could say of this very species, "Ces indications serve à mettre les naturalists à la torture," M. Frederic should now be acting in a way so truly extraordinary, for it is not easy to regard his entangled web as the result of mere carelessness or accident.

---

* P. 156.

† Règne Animal, 1817, 378.

The fossils of this order of Mammalia have an interest peculiarly their own. To find not quadrupeds—the congeners of those which now tread upon the soil, but the mighty monarchs of the deep, in the centre of immense continents, and on the slopes of lofty hills, cannot fail to excite the most profound reflections. This, along with the fact, that Cuvier has devoted to them a most painful and successful investigation, has conferred on them an interest of the highest character; and hence we are not surprised to find that these fossils receive a prominent place in almost every history of the order which has appeared. From the work before us, however, they are excluded; and our author in a few words of the introduction advertises us of this peculiarity, remarking, that he has always considered these organic remains as the proper subject of a distinct branch of science. On several grounds we consider this as matter of regret. Were the treatise entirely popular, still we think that a passing notice of these species would only increase its popularity. This is true of the other orders of the animal series. The fossil elk, the great mammoth, the extinct rhinoceros, the cave-bear, and many others which might be mentioned, are not the least interesting species of their respective genera, and are most attractive objects of natural history as beings of a bygone age, not one of which could be distinguished except by a most minute comparison with the living species. And surely, therefore, in a work like the present, which is altogether of a scientific cast, it seems a pity that they should be wholly neglected; the more so, as the science of geology must always turn to the zoologist for all the information it desiderates concerning this interesting department of its fascinating inquiries.

---

[*] Règne Animal, 1829, 289.

We now proceed to lay before our readers whatever appears most new and interesting in the work before us.

The preliminary discourse, extending to fifty pages, is composed of a general survey of the order, and dwells more especially on the peculiarities of their comparative anatomy. Here our author is minute and lucid, describing the internal as well as the external structure. One of the most interesting statements relates to a peculiarity of the arterial system, which is connected with the function of respiration. It consists in an innumerable congeries,—a vast plexus of great arteries, which, after respiration, is filled with highly purified blood, and which is lodged beneath the pleuræ, between the ribs, and on each side of the spine. The vessels forming this plexus rise from the upper intercostals, and they penetrate into the vertebral canal, and even into the cranium, by the occipital foramen. The plexus is not formed of ramifications which anastomose with each other, for they may in some degree be followed out, and unravelled as if they were only a single vessel twisted a thousand times upon itself. In addition to their connection with the intercostals, they are also connected with the vertebrals and carotids. They do not appear to communicate directly with any vein. The vena azygos is not situated anteriorly to the spinal cord, but is replaced by a considerable trunk on each side and posteriorly to the cord, which receives the intercostal and lumbar veins, and joins the superior *vena cava.* It is conceived that this singular structure is connected with the occasional long-continued suspension of respiration in the Cetacea; extending to the long period of an hour, and sometimes even more. These vessels, it will be seen, become a reservoir of highly arterialized blood, which entering gradually into the circulation will, for a long period, maintain life.*

* See p. xvii. 90.

No distinct mention is made of the source whence the information concerning this very peculiar structure has been derived. But J. Hunter accurately described it in his paper in the Phil. Trans.; and Dr Barclay pointed it out many years ago as surrounding the spinal cord of the Beluga.* Neither of these gentlemen, however, ventured to assign a use to it. M. Breschet published some remarks concerning it in the Mem. de l'Acad. des Sciences for 1834: this volume we have not been able to procure; but we learn,—though not from the work before us,—that to him belongs the merit of associating this very peculiar structure, with the no less extraordinary anomaly in the function of breathing, in this Order. Our author introduces the subject both when treating of the smaller Cetacea generally, and also in his preliminary discourse, whence we are led to infer that this remarkable piece of anatomy is not peculiar to the smaller, but occurs also among the largest genera.

Another statement, new to us, and also introduced without any reference to other authority, relates to the functions of respiration, and the anatomy of the lungs. It is in these words: "It is said that the (dauphins) smaller Cetacea have the lungs surrounded with muscular fibres, which contract both in the act of inspiration and expiration; and that the tubes so communicate with each other, that by inflating one you inflate all." In the latter part of this announcement, we recognize an observation which was made long ago by Mr J. Hunter, and therefore we have no doubt of its accuracy. The former part of the statement, on the other hand, we do not remember to have previously met with; and, if true, it would bear more ample details than have here been bestowed upon it.

A third interesting observation respects the skin, and rests upon the investigations of MM. Breschet and Roussel. According to these able anatomists, there may be discovered in the skin of the Cetacea, as well as of other Mammalia, six principal parts which rest on or penetrate into it, but which have all special and distinct functions to perform. These are, *first*, the *derme* or *true-skin*, a dense, fibrous, cellular canvas or net-work, which contains and protects all the rest. In the whales it is always white and opaque, and its superior surface exhibits a set of papillæ, the intervals of which are filled with a horny tissue—the epidermis. There is, *2dly*, the *papillæ* just alluded to, which in the whale are several lines long, and are of a pearly colour; they are composed of fibres coming from and returning to the subcutaneous nervous plexi; and among them the blood-vessels freely penetrate. *3dly*, There are the *exhalents or* perspiring apparatus, consisting of soft, elastic, spiral canals extending across the cutis, and having at their mouths a small epidermic valve, which is usually shut. *4thly*, The *inhalents* or absorbing vessels, are extremely fine, smooth, branched, and easily torn, anastomosing with each other, and forming a net-work in the skin, underneath the papillæ; they have valves. *5thly*, There is the *blennogène apparatus*, composed of secretory glands and excretory canals, which open among the papillæ, situated on the true skin, and produce a mucous matter which, in drying, becomes the epidermis; and, *6thly*, there is the *colouring apparatus*, also composed of secreting glands and excreting canals, and situated in the upper layers of the skin. This is assuredly a far more detailed account of the various parts of that wonderful covering the skin, than any we have yet happened to meet; and appears to be alike minute and accurate.

---

* Wern. Mem. iii.

Leaving these introductory details, our author proceeds to the herbivorous Cetacea, to which he devotes seventy pages, containing much valuable information. Nothing, however, occurs as peculiarly requiring our notice, except some statements regarding the Stellerus of Cuvier, concerning which we have a translation of the whole of Steller's accurate memoir in the Novæ Commentariæ Petropololit. As this work is not easily procured we regard this as a very valuable gift. Copious extracts from the memoir are to be found in Buffon and others of our more common books, but the whole will amply repay a careful perusal. We shall here specify only two particulars; and the structure of the heart shall be the first. Many of our readers may remember that an interesting account and drawing of the heart of the Dugong were given by the late Sir E. Home in one of the volumes of the Philosophical Transactions some fifteen years ago. In this paper he states that the peculiarity seen in its heart is not to be met with in any other animal. From Steller's account, however, we learn that it occurs also in the animal which is now known by his name; thus showing a curious correspondence in these two genera of the herbivorous Cetacea. The heart, says Steller, does not taper from the base to the apex, there to terminate in a single point, but it terminates in two distinct and separate apices, corresponding to the two ventricles: the separation reaches to about one-third of their extent, at which place they unite, and there resemble the usual appearance exhibited by the organ.

The other particular we shall advert to regards the mouth and the masticating apparatus. It would appear that both lips are double, that is, that there are first external and then internal lips. When the jaws approximate, the void space they circumscribe is filled up by a band of strong white bristles, somewhat like pigeon's quills, which acting like a sieve, hinder the escape of the food when the water is discharged from the mouth. The masticating apparatus is quite peculiar. It is composed not of teeth, of which this animal has none, but of two large white bones or dental masses, of which the one adheres to the palate, and the other, its opposite, to the lower jaw. Even the insertion of these bones is peculiar, for it is not into the maxillaries, but they adhere by numerous pores and tubercles corresponding to others respectively on the palate and lower jaw.* Our interest in this curious structure is still further heightened by the details of a minute examination by Mr Brandt, of certain specimens preserved in the museum of St Petersburgh. He ascertained that they were wholly horny, and composed of fibres agglutinated to one another like the baleen of the whale, and that these fibres, when examined by the microscope, are found to be composed of tubes, as is also ascertained to be the case with a great number of hairs.† Plate 7, *a*, affords a correct representation of these appearances. (This structure associates the Stellerus both with the great whales) and the Dugong; of which latter Dr Knox remarks, an extremely firm horny-looking substance seems to supply the place of the incisive teeth. It encrusts that remarkable portion of the upper jaw which, together with a corresponding and opposite one in the lower jaw, similarly encrusted, forms an extraordinary feature in the face of the Dugong."‡

In the discourse concerning the lesser Cetacea generally, there is an account of the osteology of the cranium of the *Micropterus* of Cuvier, which has not previously been published; and which, with the accompanying plate, gives an accurate idea of this part of its anatomy. Our author, in this place also, gives a rapid sketch of the anatomical structure of the group, concerning which there is little to call for observation; if it be not the oracular manner in which he determines the question now agitated regarding the functions of the blowing canal, and the *spoutings* of these animals. The point is discussed and dismissed in these words, "quoique quelques auteurs aient pensé le contraire, il parait certain que les narines des dauphins offrent un passage à l'eau que ces animaux puivent avoir besoin de faire sortir de leur arrière bouche: les attestations d'une multitude d'observateurs mettent ce fait hors de doubte."§ What will Mr Scoresby and Blainville say to this? A few details are collected concerning the size of the brain; but whether in one or more species we are not informed, and a very firm stand is thereupon made for their intelligence and amiability. M. F. Cuvier seems disposed to dispute the opinion given in the Règne Animal, that they are the most carnivorous and cruel of the order;* and accordingly, he would exclude from the crowd of fictions which have been framed, the account given by Pliny of that kind dolphin which daily transported his youthful friend to school, and of that other, which used to be the companion and play-fellow of the bathers in the present Gulf of St Euphemia on the coast of Naples; and, thirdly, Pliny's additional statement, that the fishermen were in the habit of employing dolphins to assist them in their labours, and then rewarded them for their trouble; he thinks they may contract familiarity with man, may recognize his voice, and obey him. † We have no doubt that several, perhaps the majority, of the lesser whales are acute and sagacious animals. The ancients very generally made this statement, and probably had good grounds for doing so; but we cannot suppose that such an exposition of Pliny's statements as the above, will be regarded as very satisfactory by most of our readers.

---

* See p. 48. † See p. 376. ‡ Edin. Jour. of Science, i. 157. § P. 83.

In descending to the species of this subdivision, we find that M. Cuvier has 3 *Delphinorhynci*, 16 *Dolphins*, properly so called, 1 *Inia*, 7 *Phocænæ*, and 27 Dolphins, (we use his language), whose existence and characters are not yet satisfactorily ascertained; then succeed the *Narwhal, Hyperoodon*, and *Plantanista* genera, each containing one species. Recognizing, for the moment, the arrangement indicated above, we may state concerning the dolphins, that there is a notice of a new species not generally known in this country, and which we have not seen in any other systematic work. Our author calls it the *Ceruleo-albus.* Its characters are very slightly touched upon. The snout is said to be more covered and compressed than in the common dolphin, and its fins more pointed; seen from above it is wholly of a deep steel-blue colour; the under parts are of a pure and brilliant white, variously marked with black. It frequents the eastern shores of South America. This account is taken from the Nov. Acta Nat. Cuv. T. xvi.

Another animal which is here for the first time introduced into a systematic work is the *Inias*, a very curious variety lately described by M. D'Orbigny, (Nouv. Ann. des Mus. T. iii.) In the work now under review, it is placed somewhat inaccurately between the dolphins and phocænæ or porpoises, in as much as M. D'Orbigny remarks that it forms a link between the Platanista and the Stelleras. The learned naturalist encountered this animal in (High Peru) Bolivia, in a tributary of the Amazons, 2100 miles from the sea; and in this locality it abounds, and is fished for its oil. *Inia* is a name adopted from the natives. Its body is shorter and stouter than that of many of the smaller Cetacea; its snout is in the form of a long and very slender beak, almost cylindrical, and obtuse at its extremity. It has about 134 teeth; incisors in front, and molars curiously fashioned behind, where their summits are of an irregular mammillary shape: the auditory opening is conspicuous; the blowing canal runs obliquely from before backwards, and opens nearly over the pectorals. The swimming paws are large, bulky, and obtuse at their extremities; the dorsal starts two-thirds down the back, and has more the appearance of a low ridge than a fin; the tail is large; total length about 12 feet. The colour varies, and is generally a pale blue above, passing into a rose-colour beneath. This species appears to be an inhabitant solely of the rivers, and neighbouring fresh water lakes, far up the Amazons. It associates in small troops, lives wholly on fish, and seems to come more frequently to the surface to respire, and sometimes to masticate its prey, than the salt water species. It manifests the usual strong parental affection of the order.

---

* P. 287.

† P. 99.

To M. D'Orbigny we are also indebted for a more accurate account of the *Griseus* of Cuvier, than any we have hitherto met with. Our author assigns to it the name of this enterprizing traveller, which, however, we must deprecate, as being likely to lead to confusion. M. D'Orbigny had an opportunity of examining four grown individuals of the species, which were stranded on the coast of *La Vendee*, so that all doubt is now removed concerning its long doubtful characters. M. Cuvier has favoured us with a very fair representation of this and the last named animal, the Inia. This he has likewise done with regard to the beautiful Globiceps of Risso, taken from a specimen stranded near Nice in 1829, and communicated to our author by M. Lauvillard. This gentleman mentions a trait in the habits of this species which we do not remember to have before heard of in regard to any other. It was in the month of June that a troop of them approached the shore, in the Bay of St Jean. It was then observed that they often placed themselves in a vertical position, head downwards, with the tail and the posterior third of the body projecting from the water, and continued in this position for ten or fifteen minutes at a time; they appeared as if observing what was passing at the bottom of the sea, and were probably watching for their prey. It is also mentioned, that the colour of the sexes differs, the ground-work of the males being bluish-white, and that of the females a uniform brown.

But our space warns us that we must be drawing to a close, and we the less regret this, as we have but few observations to make on the remaining pages of the volume. The author's description of the Chachalot—the Physeteræ or sperm whale, is imperfect, as it could scarcely fail to be; and more especially as Mr Beale's valuable pamphlet had not reached his hand till after his treatise had well nigh passed through the press. Like the Baron our author reduces the alleged species to one only, the *Macrocephalus.*

M. Cuvier numbers only three species under the genus *Rorqual,* established by his brother; these are the Jubbarte, the Mediterranean, and Cape of Good Hope species, thus inaccurately rejecting the *Rostratus* of Fabricius. In his plate of the first of these, which, to all appearance, is an exact copy of Lacépède's *Museau pointu,* he represents a great pouch projecting from under the tongue; and in the introductory discourse, after inquiring what is the nature of this sac, he answers, that it still remains to be ascertained. He adds, that some have supposed it to be connected with the respiratory apparatus, and others have viewed it as a swimming vessel, and, dissatisfied with these suppositions, suggests it may probably be the stomach distended after death by gas. But why the stomach? As every one knows there is much loose cellular membrane in this part of the body; and it is equally notorious that the whole of this tissue has the greatest liability to very rapid distension: this sac has only in one instance, we believe, been seen in the living, but very often in the dead animal; and we confess that this fact suggests an explanation which is alike simple and satisfactory.—We are also told, in the words of Van Breda, that the use of furrows under the lower jaw and throat is also unknown. So long as the animal is observed out of its native element we can easily believe that no satisfactory idea could be formed of its use; but when seen in water, and when it is there observed, that these furrows open out, and so produce an immense hollow bag or sac, thus supplying to the lower jaw of the Rorqual, that space which the Mysticetus, from its different shape, enjoys in the upper, then, we apprehend, that no difficulty should remain. If we remember right, M. J. Hunter, after examining the parts in the dead animal, was led to believe that these folds had no peculiar pliability, and that they could never relax and open out in the manner we have just mentioned: but, we know it is not less true that, having been examined in water, the augmented capacity of the mouth thus produced by this structure has been ascertained to be a fact, and its use thus demonstrated beyond a doubt.

In our author's account of the Greenland whale he repeats the old tale, that it reaches the length of 80, and even it is said, of 100 feet.* In a note he tells us that this is contrary to Mr Scoresby's opinion; but meets this statement by the query, Does not the great destruction of these animals prevent them from attaining their full size? We apprehend Mr Scoresby's most satisfactory answer should have superseded the necessity of this inquiry.*

---

* P. 365

Upon the whole, this volume will be found a very extensive and therefore valuable repository of facts and opinions concerning the Cetacea, somewhat hurriedly, we apprehend, and withal confusedly thrown together; a particular prominency being at the same time given to the scientific—it would often be more appropriately called the unscientific—history of the several species. The work, moreover, embodies several valuable memoirs which are not of easy attainment. Among these the most valuable are Steller's account of the Rytina, already dwelt upon. There is also the fullest account of the Beluga, we know of, given in the words of the learned Pallas, which is original, and truly valuable from the opportunities that illustrious individual enjoyed of investigating its habits and structure: it is taken from his Zoographia Rosso-Asiatica. We may also mention an interesting memoir of Van Breda's upon the skeleton of the great Rorqual brought into Ostend in 1827, and measuring 95 feet; and another, by Mr Campanyo, concerning the anatomy of the Mediterranean Rorqual, as seen in an animal 80 feet long, which was stranded at the foot of the Eastern Pyrenees in 1828. The skeleton of the former of these has been an object of interest first in Paris, and now in the United States, and that of the latter was last year exhibited in Lyons. Read with caution, this volume will prove valuable to the student, and will be found useful by the man of science.

II.—*A Monograph of the Family Ramphastidæ.* By J. Gould, F. L. S. Three parts, folio. 1833–36. London.

The ornithological works of Mr Gould have now reached to such an extent, and the illustrations are conducted with so much care, that they have become important as a series of correct and faithfully coloured figures. In 1830 a valuable collection of birds was received from the region of the Himalayas, containing several new forms, and many of the splendid species which were known only from collections of Indian drawings, or by the descriptions in Latham's general history, drawn up chiefly from these works of eastern artists. It was deemed advisable to publish a selection of these specimens, and under the auspices of the *Zoological* Society, his first work, "The Century of Birds from the Himalaya Mountains," appeared; a hundred species represented on eighty plates, accompanied with short descriptions by N. A. Vigors, Esq. Success in this work, and the wishes of several friends, induced Mr Gould to undertake another of greater magnitude, and requiring more labour to collect the species and information regarding them, " The Birds of Europe." The first seventeen numbers of this "ouvrage de luxe" have appeared; it continues with regularity, and many of the continental ornithologists are lending their aid to procure the rarer European birds, and to render the undertaking complete, and when it approaches the conclusion we shall devote a few pages to its examination.

---

* See Edin. Phil. Journ. Vol. i.

Nearly at the same time with this last mentioned work, Mr Gould published the first part of his " Monograph of the Ramphastidæ," and about twelve months after, the commencement of a similar history of the " *Trogonidæ*." The last has reached its second number, and is a work of illustrations exquisitely finished; the former is completed in three parts, and contains figures of all the species which are known to ornithologists at the present time. The size of all these works is folio, the plates are entirely lithographic, drawn mostly by Mrs Gould, and at times when the press of matter is too great, by Mr Lear. With few exceptions, they are figures of great beauty, are delineated with correctness, and, as illustrated works in ornithology, they will perhaps stand at the head of any that are now in progress. We shall now examine in more detail that which we have noted at the head of this article.

The *Ramphastidæ*, taken as a family among the Scansores, will contain several more forms than those to which Mr Gould has devoted his present monograph, which might with more propriety be entitled an account of the Linnæan genus Ramphastos. It is confined to the illustration of *Ramphastos*, as now restricted by ornithologists, and to *Pteroglossus*, as separated from it by Illiger. These birds, though of clumsy and inelegant form, presented many enticing points for the monographist. They were yet known to inhabit only the forests of tropical America, almost unexplored, except upon the coast or the margins of some of the great rivers, and extremely difficult of access. Except in the works of Azara, and previous to the expeditions of the German naturalists to the Brazils, little was known of their manners, farther than that they frequented the deepest and most secluded thickets, their habits were only seen by the native hunters who had been dispatched on an errand which might have proved fatal to the European, and the dried spoils only reached the collections of this country. A great similarity in the colours of the plumage, varying in many instances only by a difference in the distribution of the markings, required much discrimination to distinguish what had been esteemed species; and the brilliant colours of the bill, equally varied, and as closely allied in their distribution, and fading immediately after death, rendered accurate and carefully coloured plates the only way to preserve a similitude of the original tints. Our illustrations were contained in the works of Vaillant and Vieillot, both not easily procured, or they were to be found among the scattered plates of other ornithologists. Wagler,* in 1827, published the first part of his Systema Avium, describing twelve species of *Ramphastos* and fourteen *Pteroglossi,* and in general his descriptions are characterized by great correctness. They are the latest, and were looked upon as the best and most authentic. In the monograph before us, some of that naturalist's species are made synonymous with those of the older writers, and with Mr Gould's figures, while one or two are left apparently unaccounted for. This it will now be our endeavour as far as possible to point out, and we suspect that ere long another fasciculus will be required for the representation of additional birds.

In the true Toucans (*Ramphastos,*) the colours of the plumage are invariably black, white, red, or yellow, the throat and upper part of the breast, the rump and under tail coverts exhibiting the latter colours, while the body, wings, and tail are always dark. Ornithologists have taken their divisions from these; Wagler makes two, with the breast *white,* or with the breast *yellow;* Mr Gould separates them into four, A. B. C. D., combining with the colours of the breast those of the tail and coverts; but in a group so limited, the first is perhaps sufficient for every artificial purpose, and his third division C, is only characterized by a species, which is confessedly intermediate between it and the fourth or D. In the first four species of the monograph we see a great alliance in colour; they are all white, or nearly white-breasted, banded beneath narrowly with red, and the distinguishing marks are seen on the rump and tail coverts by yellow or red, and in the form and colour of the bill. *R. culminatus, Gould,* is given as undescribed; it has nothing near it in Wagler, except R. *Cuvierii, Wagl.* but seems at once distinguished from it, by the great size of the bill, its more gradual bend, and different form. *R. citreopigeus,* Gould, from the collection of Mr Swainson, seems a well

* This excellent ornithologist met with an untimely death in 1833, while on a shooting excursion near Munich: his gun exploded with fatal effect, while he was in the act of passing through a hedge.—*Gould's Monograph.*

marked species, distinguished by the lemon colour of the rump, and the entirely black bill banded with blue at the base; *R. erythrorhynchus* is known by the brilliant colour of its beak. Under this bird Wagler's *R. Levaillantii* is placed, perhaps correctly. The latter writer describes the bill of *erythrorhynchus* as "obscurè purpurea-rubra" of "Levaillantii," as læte aurantia; in the figure it is brilliant crimson, and we can easily reconcile the above descriptions to the fading colours of dried skins; a slight difference in size is the only other distinction pointed out. *R. osculans, Gould,* from the Vienna collection, is new, distinguished from the last by its yellow breast, and from *R. vitellinus* by its differently coloured bill and yellow rump. *R. toco* is a well known bird, but not very commonly brought to this country. *R. carinatus* is also well-marked. *R. Swainsonii, Gould,* has *R. ambiguus* of Sw. Zool. Illustr. given as a synonym with a? but if the lower figure be compared, there can be little doubt of their identity, the difference of marking in the bill, being very slight, is all that is mentioned as separating them. *R. dicolorus* we have always considered a well-marked bird, and one of the most common in Brazil, and the *R. tucai,* Wag., which Mr Gould places as a synonym, had not been seen by Wagler when he made his descriptions. The remaining two figures of our author, *R. vitellinus* and *Ariel,* Vigors, are very closely allied, and among their synonymy is unnecessarily entangled, that of the true R. tucanus of Linn. This bird is not known at all to present ornithologists. By Linnæus it is described "crisso uropygioque flavis," and we can see no reason to doubt the existence of a species with such a distribution of colours, particularly as we see so much alliance among the others. We should be inclined, therefore, to strike out *tucanus* altogether as a synomym to these birds, and either retain the species on the authority of Linnæus, or place it in the list of nominal ones until a specimen occurs. *R. callorhinchus,* Wagl. seems unnoticed in the monograph.

The *Pteroglossi* of Illig. exhibiting nearly an equal disproportion of bill, are marked by a greater variation of tints, and the tail is longer and cuneated; green is the prevailing colour in these birds; red and yellow still continue to mark the lower parts, the rump and crissum, but they are not distributed with so much regularity, and sometimes occur in large patches; white is wanting entirely. Wagler describes twelve species, all which are figured by Gould, with the exception of *P. Aldrovandi,* a bird which has got into our systems and histories, but for which we do not seem to have any good authority at the present day. To these eleven, another eleven species, which appear to be all well marked, are added,—a very large increase within a few years to a group so limited.

P. aracari is well known. The immature plumage of the bird is also represented, and shows a much less development of the bill, and a total want of the deep black which marks the culmen and the whole under mandible of the adult. From this bird Lichtenstein has separated one of the varieties of Latham, &c. under the name of *P. regalis*, distinguished by a different marking of the bill and a different distribution of the colours. *P. castanotis* differs also by the colours of the bill, and from *P. bitorquatus* by this also, and by the greater proportion of red which occurs on the under parts of the latter; *P. Azaræ* is also of allied colours, but such distinctions can scarcely be pointed out except upon the specimen or in an accurate figure. The most remarkable bird in the whole work is that which occurs next, *P. ulocomus*, Gould. The head and back part of the neck are covered with feathers of a whalebone-like consistence, flat glossy black, curled at their tips, and resembling in their consistency what we see on the neck of Gallus Soneratii, or one or two species of the Ibis. It has also another peculiarity in the rich vinous tint which covers the mantle or back, not seen in any other species, *P. hipoglaucus* is nearly of equal interest; it is said to be from the most elevated part of the Andes, and is remarkable for its vividly coloured bill and the bluish grey tint which entirely covers the lower parts, combined with a yellow rump and crimson lower tail coverts. *P. inscriptus; Swain.*, and *Humboldtii, Wagl.* come in here, singular from the irregular markings on the bill. *P. Baillonii, Wag.* (Aracari, Baillon, Vaill. Pt. croceus, Jard. and Selby,) is remarkable for the nearly uniform greenish saffron tint of the whole plumage. The rump is red, but it is an exception to the general colour of the group. *P. culik, Wag.* and *P. maculirostris, Lichten. and the Monograph,* are allied in form, the males in colour, but easily distinguished by the spotted bill of the latter. *P. maculatus* (taken from the same marks on the bill) was the original name for this rare bird, but changed by moderns to *maculirostris*, perhaps without much necessity. To the first of these birds is also closely allied *P. Reinwardtii*, Wag. but it is considered distinct. The bill is somewhat intermediate between the two last, but an abdominal band of yellow marks their separation. *P. Natterii, Gould,* also of the same form, and coming near to maculirostris, is more decidedly marked than the last. *P. Langsdorfii* allied to *Reinwardtii,* but differing in the colours of the bill. These five birds, varying in form from the lengthened and more graceful *aracari*, might, to the minute dividing systematist, form a small group, characterised by smaller size, but thicker and more robust make, a very general similarity of plumage both in marking and distribution, a bill of moderate size, and often marked with blotches of dark colour. In the same manner might be separated the next birds, which indeed has been done by our author under the title of *Aulacorhinchus;* they exhibit plumage entirely of a grass green, and the size of the bill is not comparatively large, but in neither case do we now think this necessary. These birds of green plumage were formerly known only by *P. sulcatus, Swain.* from specimens in the collection of Earl Derby, but they have been increased by four in addition: *P. prasinus, Lichten. P. Derbianus pavoninus,* and *hæmatopigius,* Gould; the last, at once distinguished by a crimson rump, a variation of colour not seen in any of the others bearing this plumage.

In addition to the figures and descriptions of the birds there is an interesting essay on "the Anatomy of the Toucan" by Mr Owen, with a plate exhibiting the tongue and the feet, and a section of the bill.

TRANSACTIONS AND PERIODICALS—*British.*

The Entomological Magazine. London, January and April, 1836.

THE January number commences with, 1st, Wanderings and Ponderings of an Insect-hunter, a discursive and affected paper.——2. A. H. Haliday, M. A. British species of the Dipterous Tribe *Sphæroceridæ.* In this paper, the arrangement and nomenclature of Macquart is adhered to, and thirty-eight species are described——3. Portions of a letter from the author of the letters of Rusticus to Edward Newman. These extracts contain observations on certain species of Aphides, and on the *Blacks* or larvæ of the *Athalia centifoliæ,* so destructive to the young turnip plant.——4. Francis Walker on the species of *Teleas,* &c. ——5. J. V. Thompson, F. L. S. Deputy-Inspector of Hospitals. Of the double metamorphosis in *Macropodia phalangium* or Spider Crab, with proofs of the larvæ being Zoëa in *Gegarcinus hydrodomus, Thelphusa erythropus, Eripea Carribæa,* and *Graspus pelagicus,*—an interesting paper, but the proofs are scarcely so satisfactory or fully detailed as might be wished for.——6. Notes on various Insects, by Ionicus.——7. Henry Metford, M. R. C. S. on the origin of the Entozoa in the bodies of animals,—a paper of interest, in which the author endeavours to prove, that none of the hypotheses hitherto advanced can be supported, or are sufficient to account for the origin of these beings.——8. Francis Walker, Notes on the genus Aphis.——9. Varieties, among these: the capture of various insects is recorded, among them *Colias hyale* and *electra Deilephila galii, (Sphinx) convolvuli,* &c.

The contents of the April number are, 1. Travels through North and South Carolina, Georgia, &c. By William Bartram. Extracts.——2. Appendix to Captain Sir John Ross's Narrative of his second voyage. Extracts, with a catalogue of the animals described by Captain J. C. Ross as natives of Boothia.——3. George Colgate on the Husk or Hoore in Cattle.——4. A. H. Haliday, M. A., An Epitome of the British genera in the order *Thysanoptera*, with indications of a few species.——5. J. V. Thompson, F. L. S. Deputy-Inspector of Hospitals. Natural History and Metamorphosis of an Anomalous Crustaceous parasite of *Carcinus mœnas*, the *Sacculina carcini*. An interesting notice of an extraordinary parasitic animal, apparently " less perfect and more simple in its last stage than in that of its larva :" it is desirable, however, that the intermediate stages of the supposed larva should be more accurately traced.——6. Extracts of letters from C. Darwin, Esq. to Professor Henslow. From these extracts, much may be expected from the assiduity of Mr Darwin.——7. Notes on various insects by Ionicus. ——8. Francis Walker, Monographia Chalcididum, (continued from page 206.) ——9. G. R. Waterhouse, Curator to the Museum of the Royal Institution, Liverpool, A few observations on the habits of some species of Bees.——10. Edward Newman, Entomological Notes, (continued from Vol. ii. p. 516.)——11. Notes on the Cheese and Bacon-hoppers, and the Cheese Mite.——12. List of Entomological Works.——13. Varieties.

TRANSACTIONS AND PERIODICALS—*Foreign.*

Annales des Sciences Naturelles. Zoologie, MM. AUDOUIN et MILNE-EDWARDS. *Botanique,* MM. AD. BRONGNIART et GUILLEMIN. (From page 102.) Crochard and Co. Paris, Fevrier 1836.

1. *Zoology.*

FLOURENS' *Recherches sur les communications vasculaires entre la mère et le fœtus.* M. Flourens' experiments appear to prove, that there exists a vascular communication between the fœtus and the mother, and *e contra* a like communication between the mother and the fœtus, in all animals which have a single placenta; while in animals, such as the sow, which have several placentæ, there is no vascular communication, and the connection between the mother and fœtus is one merely of contact. His experiments on ruminating animals, which have a peculiar confirmation of the placenta, were less decisive, but an attentive examination convinced him, that they were in this respect like the Pachydermata, or multi-placentular animals.——F. G. PICTET, *Mémoire sur le genre Sialis de Latreille, et Considèrations sur la classification de l'ordre des Neuropteres,*—an interesting essay. The following is an outline of M. Pictet's classification of the Neuroptera.

Neuroptera.	* *N. à demi-metamorphoses.*		
	TERMITINES.	Termitines propr.	Termès.
		Psocides	Psoques.
	PERLIDES		Perles. Nemoures.
	SUBULICORNES.	Ephémérides	Ephéméres.
		Libellulines	Libellules. Æshnes. Agrions.

Neuroptera.	** *N. à metamorphose complete.*		
	PLANIPENNES.	Myrméléonides	Fourmilions. Ascalaphes.
		Hemerobius	Hémérobes. Osmyles. Nymphès. Corydales. Chauliodes. Sialis. Raphidies. Mantispes?
	PANORPATES		Némoptères. Bittaques. Panorpes. Borées.
	PHRYGANIDES		Phryganes. Mystacides. Trichostomes. Sericostomes. Phyacophiles. Hydropsychés. Psychomyies. Hydroptiles.

Of *Sialis* two species are described—one of them for the first time, and illustrated by good figures. The larva is aquatic, but the pupa is terrestrial—an anomalous fact first observed by Roesel, and confirmed by Pictet. But, says Pictet, I have been much astonished to find, in spring, these larvæ at from six to eight feet from the water buried in a very dry earth, at the root of trees. They lived there with other terrestrial larvæ, and also with those of a Colymbetes, which appears to have the same habits. On finding these larvæ, not doubting but that they were true terrestrial species, I reared them in the earth. They lived at least fifteen days before their metamorphosis, and did not seem to have been injured. This fact, which is interesting as a trait in the economy of the genus, is important in the history of respiration. It is indeed the first instance of insects with external respiratory appendages breathing the atmosphere. The structure of these appendages is usually such, that they can fulfil their functions only when in a moist condition; if left dry they shrivel and become useless. I had reason, therefore to be astonished when I saw such larvæ live so long a time uninjured in a very dry soil.——BRANDT, *Remarques sur les nerfs stomato-gastriques ou intestinaux* (nervus sympathicus seu nervi reproductorii,) *dans les animaux invertébrés.* A translation from the German of an elaborate memoir in the third volume of "Memoires de l'Académie Impériale des Sciences."——POISEUILLE, *Recherches sur les causes du mouvement du sang dans les vaisseaux capillaries.*——ANALYSE *des travaux anatomiques, physiologiques et zoologiques présentés à l'Academie des Sciences pendant le mois de Fevrier* 1836. Of these notices we need specify the following only: JACQUEMIN'S *Recherches sur le developpement des Mollusques.*——PELTIER *sur les animaux microscopiques*—who denies the accuracy of Ehrenberg's observations on polygastric animalcules, and does not agree with Dujardin either,—affording a proof at least of the difficulty of microscopical inquiries in the ablest hands, and their great liability to deception.——DUVERNOY, *Memoire sur quelques particularites des organes de la deglutition de la classe des oiseaux et des reptiles.*——DUMERIL, *Observations sur les mouvemens de la langue chez les Caméleons.*

II.—*Botany.*

A continuation of NEES D'ESENBECK *et* MONTAGNE'S *Jungermanicarum species.*—A translation of D. DON'S paper on the class of Personate plants in Edin. New Phil. Journ. for April 1835.——KOCH'S *Description des Orobanches de la Flora d'Allemagne.*——DE CANDOLLE *sur la decouverte du Thé dans une province de l'Inde Anglaise*: abstract of a paper published in the "Bibliotheque Universelle de Genevé" for June 1835. A society was some time ago formed at Calcutta to ascertain the possibility of cultivating tea in India, and the best locality for making the attempt. The province of Assam, which adjoins the Chinese empire, was thought of; and in answer to their inquiries, Captain Jenkins informed the Committee that the mountainous region lying between Cachan and Assam appeared to him to be extremely favourable to their purpose, and that indeed in the district of Beesa a kind of tea grew wild. This important notice having been confirmed, it remained to be ascertained if the wild plant had the delicious flavour of the Chinese: and if the province was really suitable either to its culture, or to the preparation of the leaves. De Candolle fears that the wild plant of Beesa will afford an inferior tea,—not that he denies the identity of the species with the true tea, but it may prove to be a variety with only a slight odorous property. We know that even in China the value of the tea varies much in different places: it is with the Thea as with the vine, which affords from even near localities a product very different in quality, and this need give us no surprise, for, besides diversity of soil and exposure, the shrub may be influenced by many differences in the period of the gathering of the leaves, in the number of these gatherings, in the preparation of the leaves, and perhaps also in the races or varieties which have been cultivated time immemorial in each locality. The wild Thea will probably give a stronger and more acrid savour, and a less delicate perfume. This consideration, however, does not lessen the interest of the discovery. If the province of Assam, which adjoins China, produces the Thea indigenous, it ought to be eminently suited to the culture of the shrub; and were the wild plant to be found an inferior object to the cultivator, the reclaimed race might be introduced advantageously from China. The Calcutta Society have acted wisely in sending Dr Wallich, with able assistants, to examine Assam; and in such hands there can be no doubt that what science, skill, and zeal can do in effecting the society's object, will be done. We cannot refuse ourselves the pleasure of giving a translation of the following letter from Dr Wallich to M. Benjamin Delessert, dated Calcutta 10th August 1835.

"I reckon on departing in four days—first for the mountains which adjoin the Sillet, particularly for Chuvra-Poonje and Myrung, where I shall sojurn until October. Crossing then the mountains of Khassea, I shall go directly to Gowahatty in Assam, and thence to Suddeya in Upper Assam, upon the river Berhampooter, where my investigations in relation to the tea will begin. I shall be accompanied by a physician whose name is well known to you as to MM. Mirbel and Brongniart—William Griffith—a young man skilled in general and physiological botany, and who cannot fail to acquire a high reputation. Another person attached to the medical service of the India Company is to accompany me in the quality of geologist,—it is Mr John MacCleland, who is now publishing a work on the geology of the province of Kamaon. I make it my boast that it was at my recommendation that these gentlemen have been attached to the mission.

"We hope to return in April of next year, by which time the principal object of the tour will be, I think, satisfactorily attained. This object is to make every possible research relative to the locality of the true Thea (wild and indigenous) in Upper Assam. I need not say that I reckon on making with Mr Griffith enormous collections of plants,—nor need I add that I desire especially to send you a good part. I shall address the whole to the Indian Company, but I will expressly demand that the duplicates be delivered to you, and I know too well the munificence of the Directors to doubt that my request will not be complied with. Government has been very liberal in the dispositions which it has made for our mission to Assam, both to myself and to my assistants. I shall take with me several artists and gardeners, and if I can display the same ardour and energy that I had in my first expeditions, I believe I shall obtain good results. I confess, however, that twenty-eight years sojourn in India has enfeebled me both in body and mind;—so that the best guarantee for my success rests on the inappreciable advantage of having such excellent fellow-travellers."

The other papers in this number of the Annales are copied from the "Flora," with the exception of the last, entitled *Animadversiones botanicæ nonnullæ novarumque aut non rite cognitarum plantaram diagnoses, auch. F. E. L. Fisher et C. A. Meyer.*

Archiv für Anatomie Physiologie und Wissenschaftliche Medicin, &c. Von Dr JOHANNES MÜLLER. G. Eichler, Berlin, Heft i. 1836. 8vo.

The first article is by Dr Bischoff of Heidelberg, on the structure of the heart and circulation of the blood in Crocodiles.—The opinion and observations of several authors who have written on this subject, as Cuvier, Panizza, Goldfuss, Meckel, &c. are compared and commented on. Dr Bischoff seems to think that the opinions of Cuvier have not been fully borne out by more recent observations, and that the arterial system of these animals is more nearly allied to that of the Mammalia and Aves than was supposed the case by that great authority. We cannot be much surprised at the existence of discrepancies, when we recollect the obscurity in which the whole subject was involved, when the great professor commenced his labours, and when we consider the difficulty even now, of procuring the dissection of living adults of the greater part of the genus.

It appears that some differences in the internal structure of the species have already been observed, and we have no doubt that, as investigation is carried farther, that others will be found. In habits some of these creatures differ considerably from others. Crocodilus lucius, which is found in the Floridas and other southern provinces of the United States, passes the winter buried in the mud in a state of entire torpor, so that it may be cut in pieces without showing any signs of life. This habit is, we believe, unknown to the intertropical species, from the very obvious cause, that the equality of the high temperature they live in, does not require it.—Another species, the C. sclerops, which lives in the Maranon and Guiana, is subject, from the exiscation of marshy districts, in certain seasons to be left dry for considerable periods. The great gavial of the Ganges, C. longirostris, is entirely piscivorous and harmless to man, although it attains very large dimensions, whilst the common crocodile, which abounds in the same river, is extremely ferocious, and lives in a great measure on the bodies which are floated down by the stream. We think it very probable, that, although there may not be any striking difference in their internal organization, that in some points their structure may be modified to suit the peculiar economy, and adapt them to the necessities of their existence. The C. Rhombifer, in its internal structure, bears some affinity to the Ophidians. In general the circulation is lànguid, and the volume of blood small in proportion to their dimensions. An illustrative plate of the heart of C. lucius is given.

The second article is from Dr C. T. Von Siebold of Dantzic, on the Spermal Ducts of Crustacea, Insects, Gasteropodes, &c. with two explanatory plates.

Dr Weber of Bonn contributes some very interesting observations on the hip-joint and the theory of motion of the human step.

Some notices on the anatomy of the windpipe of Anas leucocephalus and Ibis falcinellus, founded on observations made upon a set of preparations in spirit of wine brought from Sardinia by Mr Küster, with other remarks on comparative anatomy, are given by Professor Wagner of Erlangen.

The windpipe of a male of Anas leucocephalus, was found to have a widening at the top, somewhat like that in Anas clangula, an inch and a-half long, below which the pipe is very narrow.

In *Ibis* falcinellus (the common Ibis,) the lower rings of the windpipe are very small, thin and rather round. They run close together, but are not joined. From the whole circumference of the last rings a strong membrane springs, which binds the two bronchials to the windpipe.

INTELLIGENCE.

ZOOLOGICAL INFORMATION.

Geographical distribution of the Chelones.—The Chelones are principally distributed in the warmer regions of the world, and near to the tropics, but they extend also to many portions of the temperate zones, reaching in the northern hemisphere to the 50° and beyond it, though in the southern they scarcely pass the 35° of S. latitude. It has been observed that the sea tortoises prefer the warmer climates, and some species are peculiar to certain parallels. The Chelonia imbricata delights in the intertropical seas, although it appears not to have been found either upon the coast of Africa or on the great Indian Ocean. The Ch. viridis, on the contrary, frequents all the seas of the torrid zone; but the Ch. cephalos, which is generally met with in the northern hemisphere, advancing to the 48°, is common in the western part of the world, while it is rare in the eastern, and appears only accidentally to frequent the coasts of countries situated beyond the equator. Spargis, again, may be considered cosmopolite, and is found either indigenously or accidentally in most of the seas frequented by the marine tortoises.

Of all countries, America produces the greatest number of the Chelones which are comprehended in the genus Emys, but this vast continent at the same time maintains only a single species of the genus Trionyx, confined apparently to the southern parts of the United States, while the only land tortoise of the new world Test. tabulata, extends from South Carolina over the greater part of intertropical America; we are ignorant, however, whether this species, common to many of the Antilles, has been originally indigenous to them, or has been imported. We might also presume this to be the case with the Indian tortoise, which is at this time distributed over the western coasts of N. and S. America from California to Chili, and we might even have suspected, that this large tortoise had been naturalized upon the Galapago isles of the Pacific, although at so great a distance from its true country if the early Spanish navigators had not met with it in abundance on these solitary and deserted islands. We have already remarked, that North America produced only one species of Trionyx, Tr. ferox, and that this country, on the contrary, is remarkably rich in species of the genus Emys. All the species agree, however, nearly with the last, or they may be considered as tortoises inhabiting equally the land or water. One of them, E. serpentina, spread over most of the provinces of the United States, is peculiarly aquatic in its habits, and evidently forms the passage to the genus Trionyx; another, on the contrary, E. clausa, common from Hudson's bay to the Floridas, approaches in its manners to the land tortoises, which it seems intended to ally to the genus it has been placed in from its own structure. Other species, as E. punctata and odorata, approach the manners of the land division, though in a less degree. They are common in the United States, but the first does not exist in the southern provinces, which the second inhabits, and has been found as far south as the river Alvarado, in Mexico. The other Emydes of North America are, E. picta, Müllenbergii and centrata, species more peculiar to the northern states, reaching even to Canada; also E. serrata, reticularia and geographica, which have been taken in many situations far distant from each other. South America also produces anomalous Emydes, possessing an organization which enables them to live habitually in the water. E. chelys, a species very remarkable from the singular form of some of its parts, inhabits the marshes of Cayenne and the province of Para; E. platycephala, common throughout Brazil and Surinam, belongs to the long-necked section, a small group characterized by habits still more peculiarly aquatic. Following these Emydes may naturally be placed the E. expansa and Dumerilii, species of large size which inhabit the banks of the Maranon and its tributaries. Finally, the E. punctularia and scorpioides, common both in the same situations and in Guiana, and differing from the preceding, the one to approach the typical forms of the genus, the other to the E. odorata, which it replaces in Southern America, and of which it is even suspected to be a variety consequent to the difference of climate.

Africa presents to us in reference to the geographical distribution of the Chelones, phenomena entirely different from those which we observed in the new world. The barren plains of this immense peninsula give rise only to torrents whose waters, absorbed during summer in the moving sands, are exhausted and dried up by the influence of the tropical heats. It is to this that we must attribute the existence of that small number of fresh water species, compared with the very considerable amount of those spread over America, and it is also from this reason that Africa maintains so many terrestrial Chelones. A single Emys, E. galeata, from the group of the long-necked Emydes, inhabits the rivers of the Cape, and is found also in Senegal. It appears that the Nile wants them entirely, for this river maintains only a single species of Trionyx, distributed also over a great part of Africa which lies under the tropics. But this vast continent with its neighbouring islands produces seven different species of land tortoises, or rather the whole known species of the genus, with the exception of that from America. Three of these, Test. angulata, areolata, and geometrica, inhabit the vicinity of Cape Town, but they are at the same time found in Madagascar, and the first has been observed at Sierra Leone. The Testt. pardalis is found on the eastern part of the colony of the Cape; the Test. radiata at Madagascar, and perhaps also in Senegal and Abyssinia. The Tes·. Indica is now indigenous to Madagascar, and also on the neighbouring islets, though it has been exterminated from those on which Europeans have been established. The Test. Greca again is only found on the northern coast of Africa from the states of Barbary to Syria.

The same land tortoise (Test. Greca, the only European species,) frequents, in this part of the world, the well-watered countries of the Mediterranean, from the Morea to France. These parts produce an Emys, E. Europea, which inhabits also Germany and Prussia, and has been found upon the Wolga; but the second European species of the genus E. vulgaris has only been observed in Spain, in Dalmatia, on the Morea, and on the shores of the Caspian sea.

Asia is inhabited by a very considerable number of fresh water tortoises, but this vast extent of country only maintains a few species of land tortoises. We have already stated that the Test. Greca inhabits a part of Syria; the Test. geometrica, an African species, is found also in the island of Ceylon; but the existence of the Test. Indica in a natural state upon the coast of Coromandel, requires yet to be confirmed by more accurate observations. Of the six known species of Trionyx, no less than five inhabit the rivers of Southern Asia. One has been observed in the Euphrates, which is perhaps identical with the Trionyx of the Nile, also found in Industan. The Ganges maintains a species, Tr. Gangeticus, peculiar, as far as it is known, to that river; another, the Tr. granosus, which forms the passage to the Emydes, is found also on the coast of Coromandel; while two others, Tr. stellatus and subplanus, have been observed from Bengal to the Island of Java. The Trionyx of Japan belongs most probably to the first of these, which would thus be nearly as widely diffused as the E. vulgaris, of which a local variety is found in the islands of that empire. The other Emydes of the south-eastern portion of Asia are E. tectum; E. megacephala, so characteristic in its heavy or unwieldy form; E. tetraonyx, intermediate between the Emydes and Trionyx, and a native of the river Irawaddy; E. Spengleri, of which several interesting varieties are known from the isle of France, Ceylon, Penang, Malacca, Sumatra, Java, Borneo, and China; and finally, two species, which vary from the others by their rounded shell, and of which one possesses a moveable sternum; E. couro inhabits China, the southern point of Celebs, and the islands of Penang, Java, and Amboyna; while the other, E. trijuga, has only been found in Java.

We are only acquainted with a single tortoise from New Holland, the E. longicollis, belonging to the group of long-necked Emydes.—*Siebold, Faun. Jap. Chelonii per C. J. Temminck, and H. Schlegel.*

Motacilla neglecta, Gould.—An adult male bird of this species was killed by Mr Hoy, in the parish of Stoke Maryland, Suffolk, on the 2d of May 1836. This we believe is the first authenticated British example of the grey-headed wagtail.

Tringa pectoralis, Buonap.—The same gentleman has also in his possession a specimen of the Pectoral Tringa, killed upon the borders of Breyden Broad, near Yarmouth. Upon dissection it proved a female. Mr Anderson, who examined the specimen, pronounced it to be the Tringa pectoralis of the United States.

Salmon, food of.—From the rare occurrence of being able to detect any thing recognizable in the stomach of the salmon (*S. salar*) on its first egress from the sea, it has by many been supposed to feed entirely upon animalcula or minute entomostraca, (according to Dr Knox upon the spawn of certain species of Asterias or star-fish.) The following fact, however, evidently shows that it is not always content with such minute prey, as indeed we had previously been satisfied in our own mind was the case, from the circumstance of its voracity in rivers, as well as in large estuaries, where it is frequently taken, by a sand-launce, used as a bait. "On Saturday, June 18, 1836, (my correspondent, G. C. Atkinson, Esq. informs me,) a female fish *S. salar* of twelve pounds weight, was taken at Tynemouth Bar, in the stomach of which were *thirteen* herring sprats; there was nothing remarkable in the external appearance of the fish, but the stomach was of large size, and has a diseased appearance." This probably arose from its great distension, but as the viscus has been preserved, we shall upon inspection be better able to judge whether this is the case or not. In corroboration of the predatory habits of the salmon, I may add, that Dr Johnston informed me a few days ago, that the stomach of a grisle (the young of S. salar,) of one and a-half pound weight, and one of the first taken this season in the Tweed, upon dissection, contained a large herring sprat, recently swallowed, as appeared from the slight decomposition that had taken place.—P. J. S.

Woodcock breeding in Scotland.—Within late years it has been remarked that woodcocks remain and breed more frequently in Scotland, and in greater numbers than they used to do. We are informed by a gentleman who rents a shooting district in the north-west of Aberdeenshire, that this season there are several pairs breeding upon the property, though they were not known to do so a few years ago, and the same is the case in other districts, as in Strathmore, &c. What reason is to be assigned for this change in their habits? is it to be attributed to a change in our seasons, or are we to look for it in the great increase of woods or plantations so general over all the island, affording these birds additional and secure retreats, as well as an abundant and constant supply of food. —P. J. S.

Ammocætes branchialis and Gasterosteus semiarmatus. Dr R. Parnell has taken specimens of both these fish in the Tweed near Berwick: the most northern *habitat* for them in Britain, which has been ascertained.—G. J.

Raniceps trifurcatus.—I picked up a specimen on the sands near Tynemouth, Northumberland, where it had been left by the tide. The fish was still alive, though, judging by the distance the sea had ebbed, it must have been out of its element for two hours.—*Albany Hancock*, May 26, 1836.—G. J.

Neritina fluviatilis, Paludina achatina, vivipara, and impura,—have lately been found in considerable numbers on the shores of the Forth, at St Davids in Fifeshire. As far as I am aware they have not hitherto been found in Scotland, and their occurrence in such a suspicious locality renders it probable that they were conveyed there in ballast, from which source the flora of the same neighbourhood has been enriched with several plants not indigenous to Britain. —*E. Forbes.*

Helix Scarburgensis.—This, the prettiest of all our native Helices, is found in one or two spots in the dean at Twizel-house, Northumberland. I have also found it, though very seldom, in Berwickshire.—G. J.

BOTANICAL INFORMATION.

Algæ Britannicæ.—Sir W. J. Hooker is preparing a "*Manual of the British Marine Algæ,*" and will be thankful to receive specimens of new or rare species from any part of our coasts, as well as information respecting unpublished localities of the scarce kinds. The descriptions will be written entirely in English, and all unnecessary *technical* terms will be avoided.—*Comp. to Bot. Mag. for June* 1836.

Erica Mackaiana, Babington.—Many-branched cross-leaved heath. "Leaves four in a whorl, ovate, ciliated, smooth; flowers capitate, pedicelled; sepals ovate, ciliated; smooth; pedicels villous and downy; corolla oblongo-ovate; anthers awned, included; style exserted."—Bab. MSS.

On the declivity of a hill by the road side within three miles of Roundstone, Cunnamara, Mr W. M'Calla. Fl. July, Aug. Specimens of this presumed new species were left for me in September 1835, by Mr Babington, and soon after I received others from the discoverer, when at first sight it struck me as being different from any species I was acquainted with. In its ovate, ciliated leaves, it much resembles E. ciliaris, while in its mode of flowering and awned anthers it agrees with E. Tetralix; it, however, differs from that species in its more shrubby habit and in the disposition of its branches, which, instead of having the flowering ramuli generally springing from one point (determinate ramosi) they are irregularly disposed and much crowded towards the top of the main branches. Dr Hooker, who has kindly sent me a figure of this, is not as yet decided in his opinion whether it will ultimately prove a distinct species from E. Tetralix. There is, however, I think, no doubt of its being at least a very distinct variety.—*Fl. Hibernica, J. T. Mackay.*

MISCELLANEOUS INFORMATION.

Questions de l'Académie Royale des Sciences de Berlin pour les concours des années 1837 *et* 1839.—1. Parmi les Vers soit d'eau douce soit d'eau marine soit intestinaux il en est plusieurs auxquels on ne sauroit encore assigner avec une précision suffisante leur place dans le système, parceque leur anatomie est ou bien entièrement ignorée ou imparfaitement connue. L'Académie demande l'anatomie exacte des formes aux quelles ces incertitudes s'appliquent le plus éminemment : parmi les Vers, *Gordius aquaticus* (ou telle autre espèce de *Gordius*), surtout s'il est possible *Nemertes Borlasii ;* ici ce que l'on connoit déjà de la structure de *Anguillula fluviatilis, Ehrenb.*, des Annelides, des Planaires et des Filaires pourra servir de point de comparaison. Quant aux Vers intestinaux l'Académie désire des renseignemens nouveaux sur *Pentastoma*, sur une espèce quelconque des Tenioides et des vers vesiculaires, et sur les Cercaires. Le but de ces recherches est d'arriver à une description anatomique du système digestif, de celui des organes de la genération, et des systèmes nerveux et vasculaire, ou du moins des parties de ces systèmes organiques dont il aura été possible d'avérer l'existence. En combinant ensuite les résultats de ces nouvelles recherches, avec les données anatomiques précedement connues on soumettra, à un examen critique les différentes positions assignées à ces Vers et à ces Intestinaux dans les systèmes zoologiques.

Le 31 Mars 1837 est le terme de rigueur pour la rentrée des Mémoires, qui doivent être anonymes et accompagnés d'une devise avec nom d'auteur sous cachet. L'attribution du prix de 50 ducats est fixée à la séance publique du 3 Juillet même année.

2.—*Prix fondé par legs pour une Question d'Economie Rurale.*—Parmi les végétaux d'une saveur douce il en est plusieurs qui contiennent le sucre en des proportions quelques fois assez ramarquables, ausi que Marggraf l'a déjà prouvé pour la Bette rave, qui par les procédés appropriés à l'extraction du sucre est devenue dans plusieurs pais un produit très important de l'économie industrielle.—L'Académie désire que pour une grande majorité de plantes abondantes dans nos climats qui non point encore été soumises avec succès à un pareil examen, on applique les mêmes tentatives d'extraction soit à la plante entière soit á quelcune de ses parties. L'Académie demande en outre pour chaque plante une détermination précise de l'espèce de sucre qu'elle contient, soit de Cannes soit de Grappes soit de Manne soit de telle autre modification. Il est par conséquent nécessaire que les competiteurs joignent à leurs mémoires un échantillon du sucre extrait de chaque végétal, et cela en etat de crystallisation s'il est de la nature du sucre de Cannes ; mais comme il est souvent très difficile en opérant sur de petites quantités de faire disparoitre entièrement les substances étrangères qui donnent au sucre une couleur brune, l'on n'exige pas que les échantillons soient d'une pureté et d'une blancheur parfaite.

Considérant l'étendue et la multiplicité des détails d'une pareille recherche la Classe fixe à quatre années la durée du concours et en double le prix.

Le 31 Mars 1839 est le terme de rigueur pour la rentrée des Mémoires, qui doivent être anonymes et accompagnées d'une devise avec nom d'auteur sous cachet. L'attribution du prix de 100 ducats est fixée à la séance publique du 3 Juillet même année.

State of Natural History in Newcastle-upon-Tyne.—It is only of late years that an institution has been established in Newcastle for the promotion of Natural History, yet previously there had not been wanting a few individuals who had devoted their attention to this branch of science with success. Among these may be mentioned the celebrated Bewick, whose histories of Quadrupeds and British Birds are too well known to need commendation here. But the attention of the Newcastle naturalists was until lately principally directed to the study of Botany. The result of a careful investigation of the Flora of the district was given to the public in 1805, in the form of a Botanist's Guide to the counties of Northumberland and Durham, by Messrs Winch, Thornhill, and Waugh. Mr Winch has since published several detached essays on botanical subjects.

The Literary and Philosophical Society of Newcastle, a valuable institution, founded upon a liberal basis, has now been in existence for upwards of forty years. This institution supports an extensive library, an annual course of lectures on literature, natural philosophy or natural history, and, according to the plan of its founders, a museum. This latter object, owing to the want of sufficient funds, and perhaps also to the lukewarmness of a majority of its members, remained for a number of years little more than a dead letter. In the year 1822, however, the society, on the recommendation of G. T. Fox, Esq. purchased the private museum of the late George Allan, Esq. of Blackwell Grange. This collection, celebrated in its day, was originally formed by Marmaduke Tunstall, Esq. of Wycliffe, and afforded many subjects for the works of Pennant, Latham, and Brown. Bewick also drew from specimens contained in it some of the rarer species of his " British Birds." The principal feature of this museum, in fact, was the fine collection of British birds, many of which have now suffered from the unsparing hand of time. It also contained a good collection of the South Sea curiosities brought to England by the celebrated Captain Cook. The history of the whole collection, with biographies of its former possessors, is minutely detailed in a volume published by Mr Fox, entitled a " Synopsis of the Newcastle Museum." The society first opened this museum to the public in a room of their new building in 1826, and appropriated a portion of their funds for its support. This was afterwards increased by a private subscription among the friends of natural history. But it was soon found that to support a museum at all adequate to the importance of the town and the increasing taste for the subject, required funds far beyond what the Literary and Philosophical Society could spare for the purpose. Under these circumstances a few of the friends of natural science in Newcastle undertook the establishment of a Natural History Society.

The project succeeded even beyond their most sanguine expectations ; and, aided by several country gentlemen and coal-owners of the neighbourhood, the present "Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne" soon sprang into existence; the Duke of Northumberland consenting to accept the office of Patron, and the Bishop of Durham that of President. A proposal was made to the Literary and Philosophical Society to purchase their museum as the nucleus of the new collection, which being declined, the Natural History Society, unwilling to establish a museum in opposition to that of the old institution, after some little difficulties in the negociation, came to an agreement with the Literary and Philosophical Society to take charge of and arrange its collection along with that about to be formed, and in consideration of an annual payment to allow its members and their friends free access to the museum. The bond of union was still further cemented of the purchase by the Natural History Society of a piece of ground adjoining the other society's building, on which has been erected a handsome museum. This has been connected by a short gallery with the library of the Literary and Philosophical Society, the whole forming an elegant suite of rooms. The present museum, which was opened in December 1834, contains an excellent collection of British birds, embracing, with the rarities of the Allan Collection, a series of beautiful recent specimens, preserved by the curator, M. R. R. Wingate, in a very superior style, and with a minute attention to the anatomy and habits of the birds. Associated with these is a collection of their eggs. Of foreign birds there is a good and rapidly increasing collection. The Mammalia and fishes are not numerous, but among the latter are a few curious and rare species; and a noble specimen of the polar bear, admirably set up, is conspicuous among the former. It may be sufficient to say of the other departments of zoology that the collections are very respectable, particularly those of shells, insects, and corals. An entire room is appropriated to geology, and contains an excellent collection of fossils, in which the fossil plants of the coal formation hold a conspicuous place. A very fine collection of minerals, the property of Mr Hutton, is deposited in the museum for exhibition. Nearly the whole of the collections are now arranged according to the most approved modern systems—not forgetting, at the same time, such a disposition of the different parts as may make the whole agreeable to the eye of taste. It is to be regretted that there are as yet no specimens of comparative anatomy in this museum. This branch of study is becoming daily more important, on account of its use in the natural classification of animals. We hope, therefore, that some of the young students of anatomy connected with this town will endeavour to supply the deficiency.

The society has now been in existence six years, and consists of between two and three hundred members. It holds meetings monthly, excepting in the summer quarter, when there is a recess. From the papers read at these meetings two volumes of Transactions have been published.* As might be expected in a district of great mining importance, the principal part of the papers are geological. Many of these contain very valuable information connected with the operations of mining. The articles on Zoology and Botany are chiefly descriptive of local species. Among them are the following papers—On the Birds of Northumberland by P. J. Selby, Esq.—on the Zoophytes of Berwick Bay by Dr Johnston—on the land and fresh water Mollusca of the neighbourhood of Newcastle by Mr Alder,—and a Flora of Northumberland and Durham, by Mr Winch. In connection with this subject it may be permitted us to mention Lindley and Hutton's Fossil Flora of Great Britain; one of the authors of which is a secretary and active promoter of this society; many of the specimens figured in the work have been procured from the coal mines near Newcastle. British Oology is another work emanating from a member and late secretary of this society, Mr W. C. Hewitson, whose removal to a distant part of the country the society has lately had to regret.

---

* A new volume is nearly ready for press.

It is worthy of remark, that the Natural History Society of Newcastle is not a company of shareholders, gaining an individual advantage by the increase of the museum. Each member retains an interest in the property of the society no longer than while he remains a subscriber. The subscription is one guinea per annum, without entrance fee; and the museum, while professedly open to members of both societies and their friends, is virtually so to all respectable persons, residents as well as strangers, without any charge for admission. The society has not hitherto suffered any diminution of its funds from pursuing this liberal course, and it is to be hoped that the public spirit of the inhabitants of Newcastle will enable it hereafter to continue the same plan; the object of the society being "to diffuse more generally a taste for those refined and rational pleasures to be derived from the study of the works of nature."—In conformity with this plan the museum has also been occasionally opened in an evening for the accommodation of the working-classes.

There are some good private collections in Newcastle, the most valuable of which is Mr Adamson's splendid cabinet of shells, the finest in the north of England. Mr John Hancock has an interesting museum of British birds and other vertebrated animals, beautifully preserved by himself. Mr George Wailes's extensive and valuable cabinet of British insects is well worth the attention of the entomologist; and Mr J. Alder has a very good collection of British shells. In botany Mr Winch's fine herbarium takes the lead, but those of Mr William Robertson and Mr R. B. Bowman also contain a very extensive series of British plants, to which the latter has in his late tour in Norway added many interesting plants from that country. Mr W. Hutton's collection of vegetable fossils is perhaps the finest extant. A few smaller collections might here be named, but enough has been said to indicate the state of natural history in this town, and to guide the scientific traveller to such objects as he may wish to investigate.

Fauna Japonica, Ph. Fr. D. Siebold.—The Crustacea under the superintendence of M. De Hann, in two Fasciculi, with uncoloured lithographic plates, and the Chelonii by C. J. Temminck and H. Schlegel, also with uncoloured lithographic plates, have just reached us, as all which has yet appeared of this very important work. M. De Hann has attempted to arrange the Crustacea upon the principles laid down by Mr Macleay, and will be found to contain some very interesting information. A more extended notice will be devoted to it.

NOTICES AND PROCEEDINGS OF SOCIETIES—LONDON.

ROYAL SOCIETY, January 14.—Dr Daubeny's paper, "On the action of Light upon Plants, and of Plants upon the Atmosphere," was concluded. This interesting paper was commenced at the concluding meeting of 1835. "The objects of the experimental inquiries of which the author gives an account in this paper were, in the first place, to ascertain the extent of the influence of solar light in causing the leaves of plants to emit oxygen gas, and to decompose carbonic acid, when the plants were either immersed in water, or surrounded by atmospheric air. The plants subjected to the former mode of trial were, Brassica oleracea, Salicornia herbacea, Fucus digitatus, Tussilago hybrida, Cochlearia armorica, Mentha viridis, Rheum rhaponticum, Allium ursinum, and several species of Gramineæ. Geraniums were the only plants subjected to experiment while surrounded with atmospheric air. Comparative trials were made of the action on these plants of various kinds of coloured light, transmitted through tinted glass, of which the relative calorific, illuminating, and chemical powers had been previously ascertained; and the results of all the experiments are recorded in tables; but no general conclusion is deduced from them by the author. He next describes a few experiments which he made on beans, with a view to ascertain the influence of light on the secretion of the green matter of the leaves, or rather to determine whether the change of colour in the chromule is to be ascribed to this agent. The third object of his inquiries was the source of the irritability of the Mimosa pudica, from which it appeared that light of a certain intensity is necessary for the maintenance of the healthy functions of this plant, and that when subjected to the action of the less luminous rays, notwithstanding their chemical influence, the plant lost its irritability quite as soon as when light was altogether excluded. He then examines the action of light in causing exhalation of moisture from the leaves; selecting Dahlias, Helianthi, Tree Mallows, &c. as the subjects of experiment. The general tendency of the results obtained in this series is to show that the exhalation is, *cæteris paribus*, most abundant in proportion to the intensity of the light received by the plant. He also made various comparative trials of the quantity of water absorbed, under different circumstances, by the roots of plants, and chiefly of the Helianthus annuus, Sagittaria sagittifolia, and the Vine. From the general tenor of the results of these and the preceding experiments, he is inclined to infer that both the exhalation and the absorption of moisture in plants, as far as they depend on the influence of light, are affected in the greatest degree by the most luminous rays; that all the functions of the vegetable economy which are owing to the presence of this agent, follow, in this respect, the same law; and that in the vegetable, as well as in the animal kingdom, light acts in the character of a specific stimulus. The author found that the most intense artificial light that he could obtain from incandescent lime produced no sensible effect on plants.

"The latter part of the paper is occupied by details of the experiments which the author made with a view to ascertain the action of plants upon the atmosphere, and more especially to determine the proportion that exists between the effects attributable to their action during the night and during the day; and also the proportion between the carbonic acid absorbed, and the oxygen evolved.

"His experiments appear to show that at least 18 per cent. of oxygen may be added to the air confined in a jar by the influence of a plant contained within it. He also infers that the stage of vegetable life at which the function of purifying the air ceases, is that in which leaves cease to exist. The author shows that this function is performed both in dicotyledonous and in monocotyledonous plants, in evergreens as well as in those that are deciduous, in terrestrial and in aquatic plants, in the green parts of esculents as well as in ordinary leaves, in Algæ and in Ferns as well as in Phanerogamous families. Professor Marcet has shown that it does not take place in Fungi.

Jan. 21—Sir David Brewster's paper, "On the Anatomical and Optical Structure of the Crystalline Lenses of animals." The author has examined the structure of the crystalline lens of the eye of a great variety of animals belonging to each of the four classes of Vertebrata; and has communicated in this paper a detailed account of his observations, arranged according as they relate to structures more and more complex. In a former paper, published in the Philosophical Transactions for 1833, the lens of the Cod fish was taken as the type of the simplest of these structures, in as much as all the fibres of which it is composed converge, like the meridians of a globe, to two opposite points, or poles, of a spheroid or lenticular solid; both of which poles are situated in the axis of vision. The structure which ranks next in respect of simplicity is that exhibited in the Salmon, among fishes; in the Gecko, among reptiles; and in the Hare, among Mammalia. It presents at each pole two septa placed in one continuous line, in different points of which all the fibres proceeding from the one surface to the other have their origin and termination. A structure somewhat more complex is met with in the lenses of most of the Mammalia, and is particularly exemplified in the lion, the tiger, the horse, and the ox. Three septa occur at each pole in the form of diverging lines inclined to one another at angles of 120°. The next degree of complexity is presented in the lens of the whale, the seal, and the bear, which contain, instead of three, four septa on each side, placed at right angles to each other in the form of a cross. In some specimens of lenses of whales and seals the author observed two septa from each pole, forming one continuous line, from each of the extremities of which proceeded two others which were at right angles relatively to one another: so that there were in all five on each surface. The most complex structure is that of the lens of the elephant, which exhibits three primary septa diverging at equal angles from the pole, and at their extremities bifurcating into two additional septa, which are inclined to each other at angles of 60°, these latter being the real septa, to which the fibrous radiations are principally related. In some lenses of the elephant the author found the three septa immediately proceeding from the poles exceedingly short, and approaching to evanescence; so that he has no doubt that occasionally they may be found to have disappeared, and that the other six septa will then all diverge from the poles, like the radii of a hexagon, at angles of 60°.

February 4th.—" Memoir on the Metamorphoses in the Macroura, or long-tailed Crustacea, exemplified in the Prawn (Palæmon serratus.) By John V. Thompson, Esq., F. L. S., Deputy Inspector-General of Hospitals. Communicated by Sir James Macgrigor, M. D., F. R. S., &c.

" The author gives descriptions, illustrated by outline figures, of three different stages of growth of the Prawn; the first being that of the larva, immediately on its exclusion from the egg; the second, at a later period, when it has acquired an additional pair of cleft members, and a pair of scales on each side of the tail; and the third, at a still more advanced stage of developement, when it presents the general appearance of the adult Prawn, but still retains the natatory division of the members, now increased to six pair. The author thinks it probable that an intermediate stage of metamorphosis exists between the two last of these observed conditions of the animal."—*Lond. and Edin. Phil. Mag.*

Medico-Botanical Society, April 27, 1836.—W. T. Iliff, Esq. in the Chair. Mr Iliff presented specimens of the Ilex Paraguayansis, or Paraguay tea. The Ilex, according to the description given of it, is about the size of an orange tree, and has opposite, shining, oblong, serrated leaves. The flowers are in axillary umbels, and have four petals, and four stamens. The leaves, which are gathered for tea, are taken from plants of two or three years of age, or when the trunk is about an inch in diameter; they are very fragile when dry, and M. Virey says the natives are suspected of breaking the leaves, so as to prevent a discovery of the plant from which they are obtained. The leaves of the Mati are prepared for making the tea in the following manner: A long cylindrical furnace is constructed, termed a barbagna, in which a bright fire is made with the dry branches, from which the leaves had previously been separated. When this furnace is sufficiently heated, the leaves are spread on metallic plates, so that they do not touch each other and are then introduced into it. An attendant called quayno, if expert, will prepare twenty-five pounds a day. The dried leaves are packed in cotton bags of a large size.

The people of South America attribute the most astonishing properties to the Mati, and use a very large quantity of it. If it be taken in moderation, it causes excitement and watchfulness, but if it be taken in excess, it produces drunkenness and tremors, resembling those induced by the abuse of spirituous liquors. Opium appears to cause opposite effects, and is therefore used as a remedy to obviate the injurious consequences induced by the Mati.

Dr Sigmond afterwards proceeded to lay before the society the results of a series of experiments on copaiba, conducted in Mr Battley's laboratory. From these it appears that trituration of the copaiba with magnesia, then making a tincture with proof spirit, and adding a little nitrous ether after filtering the spirit, affords the best preparation of the balsam. From one drachm to four, two or three times a day, is the dose.

Professor Johnson then delivered a lecture on the philosophy of botany, after which the meeting adjourned.—*Communicated by Mr Foote, one of the Secretaries.*

EDINBURGH.

ROYAL SOCIETY, March 21, 1836.—Rev. Dr Chamlers, V. P. in the Chair. Observations and experiments on the coloured and colourable matter in the leaves and flowers of plants, particularly in reference to the principles upon which acids and alkalis act in producing red and yellow or green, (continued from 18th January.) The paper terminated with the following general conclusion, that there exist in plants two distinct colourable principles, two species of chromogen, one which generates red compounds with acids, and denominated Erythrogen; and another which forms yellow compounds with alkalis, called Xanthogen. That these two principles occur together in red and blue flowers, and in the leaves of a few plants, which exhibit the former of these tints; that all green leaves, all white and all yellow flowers, and white fruits contain xanthogen alone; that litmus abounds in erythrogen but has no xanthogen; that the chromules of different tints may be generally considered distinct vegetable principles, or compounds having their own proper hue; sometimes intimately blended, or chemically combined with chromogen; at other times having no connection with it; that they are also occasionally, but not frequently, compounds of chromogen with acids or alkalis. The paper will be continued.

April 4, Dr Hope, V. P. in the Chair. Communication "On the newly discovered Microscopic Entozoon infesting the Muscles of the Human Body, by Dr Knox."

April 18, Sir T. M. Brisbane, President in the Chair. Mr Stark read a communication from Dr Parnell, on the occurrence of the Clupea alba or whitebait, and of the Raniceps trifurcatus or tadpole fish, in the Frith of Forth.

May 2, Sir T. M. Brisbane, President, in the Chair. Dr Knox exhibited some specimens to prove that the teeth of the Cachalot are devoid of enamel.—*Proceedings of Royal Society, Edinburgh,* No. 9.

Wernerian Natural History Society, March 12, 1836.—Robert Jameson, Esq. P. in the Chair. The Secretary read Dr Richard Parnell's account of the occurrence of the White-bait, *Clupea alba*, in the Frith of Forth, in considerable abundance; and also his description of the Sprat or Garvey-herring, *C. Sprattus*.

March 26.—David Falconar, Esq. formerly V. P. in the Chair. The Secretary read Dr Parnell's account of the Tadpole fish, *Raniceps trifurcatus*, and of the Sea-snail, *Cyclopteris liparis*, observed by him in the Frith of Forth, and specimens of both were exhibited. Mr Wilson, for the Secretary, then read Remarks on the Vitality of the Toad, communicated by the Rev. Edward Stanley of Alderley Rectory.

Dr Thomas Aitken gave an account of the anatomy of a specimen of the Ursine Sloth, *Ursus labiatus*, which died a short time ago in a travelling menagerie, while at Edinburgh, demonstrating the peculiarities of the organs of respiration and digestion. The stuffed specimen of the animal was also exhibited.

Professor Jameson exhibited a series of birds from Northern India, collected by Mr Hamilton Stirling, which, he remarked, was remarkably interesting, as presenting many species which were not known to exist in that quarter. Mr William Jameson pointed out several of these; of the rapacious order he noticed the Milvus govinda, and Accipiter dukhunensis, the former of which was considered to be probably the young of the Falco cheela. With regard to the geographic distribution of the genus Milvus, it was stated, that it occurs in all the different continents of the Old World and New Holland, but that it has not as yet been detected in the New World, its place being there supplied by the genus Nauclerus. Specimens of the Gypaetos barbatus were again laid before the Society, Professor Jameson having many years ago exhibited this bird sent from Northern India by Lieutenant Tytler (which, since that time, has been discovered by other travellers,) for the purpose of pointing it out under the form of the Vultur niger, it in the young state being considered as a distinct species, and described under this name; and also for the purpose of showing that it from the nest upwards, undergoes the same changes as the European specimens, a character, before all others, marking them to be one and the same species. In regard to British birds in general, in connection with Indian ornithology, Mr Jameson stated, that more than one-third of them occur in India, either identical with, or undergoing certain slight modifications in the colour of the plumage, size, &c., characters which, if their habits and manners are the same, would lead him to consider them rather as marked varieties than as new species. To the diurnal rapacious birds Mr Jameson particularly directed the attention of the Society, and stated, that of the 18 diurnal birds of prey found in this island, the following striking distribution was presented, viz. In common with Europe 3; Europe and Asia 2; Europe, Asia, and New Holland, 1; Europe, Asia, Africa, and New Holland, 3; Europe, Asia, and North America, 5; if, however, the Circus cineraceus exists in North America, which is not at all improbable, we shall have 6; Europe, Asia, and South America, 1; Europe and North America 3. To these conclusions, Mr Jameson remarked, he had come, principally from an examination of the magnificent collection of the Museum of the University of Edinburgh. After some other general observations on the identity of particular species of rapacious birds, in which it was stated, that the Falco cherrug of Gray, is the female of the Falco islandicus; the Circus pallidus, Sykes, the young male of the Circus cyaneus; the Circus variegatus, the Circus rufus,

&c.; Mr Jameson exhibited specimens of the Gallus bankiva in its various stages, and remarked, that it is probably one of the originals of the domestic fowl, which seems to have originated not from one, but from many species; Bucco grandis; Phasianus albo-cristatus in its various stages; Parus (Leiothrix) furcatus, Temminck; Cinclus Pallasii, Temminck. With regard to the characters assigned to the genus Leiothrix by Swainson, of which the Parus furcatus is the type, and which has been justly separated from the true Parianæ, some observations were made showing that several of these are quite inapplicable to the type of the genus. In exhibiting the Cinclus Pallasii, Mr Jameson remarked, that the genus was confined for many years to but one species, the existence of the Pallas Dipper being called in question, and that not found out of Europe. Now, however, we have three, and probably a fourth (a bird existing in the collection of the University of Edinburgh, which may be placed in this genus, or rather forms a connecting link between the genus Cinclus and that of Pitta,) some of which are found in all the great continents of the world, with the exception of New Holland. That the Cinclus Pallasii is the same as the Cinclus Americanus, an opinion advocated by L. Bonaparte, can only be maintained by those who have not had an opportunity of comparing the two species, being very apt to be misled, by the meagre description of the former by Temminck; one character alone, distinguishes the two species, viz. the Pallas Dipper is more than a third larger than the American; moreover, the latter never assumes the colour of the former, at least Mr Jameson was unable to detect, in a series of specimens of the Cinclus Americanus, in the Museum of the Universisy of Edinburgh, the slightest approach to the tinge of colour assumed by the Pallas Dipper. A specimen of Wryneck (Yunx torquilla) was exhibited, which was killed in February last in Fifeshire.—The Society adjourned till November.—*Ed. Phil. Journ.* No. 41. July 1836.

PROVINCIAL.

SHROPSHIRE AND NORTH WALES NATURAL HISTORY AND ANTIQUARIAN SOCIETY,—instituted in November 1835, and opened with an address by the Ven. Archdeacon Butler, the first President. The terms are one guinea yearly, or ten guineas as a payment in composition. The branches of science to be promoted are subdivided, and curators appointed to superintend each department.

Antiquities, T. F. Dukes, Esq., and Mr Henry Pidgeon.
Botany, Rev. S. M. Wakefield, and T. W. Wilson, M. D.
Entomology, Rev. F. W. Hope, and W. W. Watkins, Esq.
Geology, Thos. Du Guord, M. D., and John Wayfield, Esq.
Mineralogy, Rev. J. M. Wakefield, and Mr S. Whitny.
Ornithology, T. C. Eyton, Esq., and Thomas Sutton, Esq.

The first general meeting was held in January 1836.

OBITUARY.

We regret to learn that the reports of the fate of Mr Richard Cunningham have proved too true. The following letter, which we copy from Loudon's Gardener's Magazine, will give the truest account of the melancholy occurrence, which took place after his separation from the expedition with which he was connected.—" The last arrival of mails from Sydney has put the government in possession of the report of the officer of police (Lieut. Zouch, 4th regiment,) who had been sent in command of a party of mounted police, to the spot where my poor brother was last heard of, with a view of ascertaining his fate. A copy of the report (now before me) has been enclosed me by order of Lord Glenelg, (Colonial Secretary ;) and from it, it appears that after leaving Boree, on the present western verge of the colony, beyond Bathurst, Lieut. Zouch and party of troopers, accompanied by one of Major Mitchell's men, and a friendly native-black, named *Sandy*, proceeded to the N. W., towards the Bogan. On the third day of their advance (viz. the 2d of November last,) they fortunately met with two blacks, who knew all the particulars of a white man having been murdered on the Bogan: also the names and persons of the perpetrators of the deed; and, as they offered to accompany the party to the country where the murderers were encamped with their tribe, Lieut. Zouch most gladly accepted their services as guides; and, on the evening of the 6th, the party, by their directions, came upon a tribe consisting of upwards of forty men, women, and children, who were bivouacing on the banks of a lake fed by the Macquarie, and called the Budda. As no resistance was offered by these savages, they were immediately invested, and taken prisoners. A few questions produced an acknowledgment from them, that a white man had been killed by four of the tribe, on the Bogan, three of whom they delivered up; and the fourth they stated, was absent on the Big River; that is the Darling. On searching the bags of the tribe, the party found a knife, a glove, &c., which the three blacks acknowledged they had taken from the white man, and which the man who had been with Major Mitchell on his expedition, and now accompanied the police, said he was sure had belonged to my brother. The details of the closing scene of my poor relative's life are dreadful in the extreme, and, to those of his friends who had known his great benevolence of mind, his last moments can be more readily conceived than described!

" The officer goes on to report, that the three murderers, on being taken prisoners, admitted that, about six moons ago, they met a white man on the Bogan, who came up to them, and made signs that he was hungry; that they gave him food; and that he encamped with them that night. The white man repeatedly getting up during the night, excited their suspicion; and, under the apprehension that he would betray them into the hands of some enemies in the neighbourhood, they consulted together, and soon came to the determination to destroy him; which they effected the following morning, by one of the savages approaching him unperceived, and striking him on the back part of the head, and the others rushing upon him with their spears. This must have occurred about the latter end of April of the last year.

" The officer adds: ' I then determined to proceed to the spot where the murder was committed, which, I was informed by the blacks, was distant three days' journey; but learning from them that there was a great scarcity of water, I deemed it advisable to take only a small party, consisting of three troopers, the man of Major Mitchell, and one of the prisoners (Bureemall) as a guide across to the Bogan; leaving the remainder of the party, having the other two prisoners in charge, under the command of Corporal Moore, to proceed to a station about thirty miles distant from Wellington, there to await my return." Lieut. Zouch and his reduced party were now conducted to a place named Currindine, where the black showed him some bones, which, he said, were those of the white man they had killed; and pointed out a small portion of a coat, and also part of a Manilla hat. Being thus convinced that they had reached the spot where the very melancholy event had occurred, the officer and his little party, with true Christian-like feeling, collected all the remains they could discover; and having, in sad silence, deposited them in the ground, they raised a small mound over them, and barked some of the nearest trees, as the only means in their power of marking the spot whereon a man wholly devoted to science had, in the earnestness and zeal with which he was prosecuting botanical investigation (attached, as he was, to the explorative expedition of Major Mitchell,) been deprived of life, by the hands of mistaken savages!'

"Thus fell, in the very prime of life (having just completed his forty-second year), Richard Cunningham, an able botanist, and in other respects a very talented man; whose very amiable and obliging disposition had in his lifetime secured as much to him general esteem, as his premature, ever to be lamented death had produced a universal sentiment of unfeigned grief, in the minds of all his friends in England, and of every colonist in New South Wales.

"I have now given you the substance of the last official communication received from New South Wales, and which is a final one, regarding my poor brother; who, you will observe, was but one night living with the natives. We cannot tell what might have been the state of his mind on that night, which had urged him repeatedly to rise, walk about, and listen to catch the bark of dogs, or any little stir (amidst the dead stillness of midnight,) from the considerable encampment of his anxious sleepless companions, not far removed from him at the time! How dreadful must have been his feelings may be readily imagined. But, could he have composed himself, and not have risen and thus excited the suspicions of the savages among whom he was reposing, he probably would have been recovered, in a day or two, by his companions, who came to the native encampment but a day or so too late! He had a mind well disciplined by the religious education he had received; and, in perfect possession of his mental faculties, could soon have reconciled himself to a short lie in a remote desert, with savages, until rescued by his party: for he could say, with real feeling, and in firm belief in the existence of a merciful protecting Providence, in the desert and every where,—

'There is mercy in every place:
And mercy, *encouraging* thought!
Gives even affliction a grace,
And reconciles man to his lot.'

I can go no farther with you; but, standing relatively as I do, in this sad business, let me now for ever draw a veil upon the whole; just remarking, that two of the blacks found means to escape from the soldiers; and what has been done with the third, who was conveyed to Sydney, and there lodged in jail, is not known: for it appears very doubtful whether any evidence could be obtained, sufficient legally, to substantiate his guilt. Last December, the law officers had the case before them.—*A. C. Strand on the Green, Kew, June* 17, 1836."

EDINBURGH: PRINTED BY JOHN STARK, OLD ASSEMBLY CLOSE.

MAGAZINE

OF

ZOOLOGY AND BOTANY.

ORIGINAL COMMUNICATIONS.

I.—*On the Natural History and Relations of the Family of Cuculidæ or Cuckoos, with a view to determine the series of their variation.* By WILLIAM SWAINSON, F. R. &. L. S. &c.

IN submitting to the scientific world the result of my investigations on this and all other natural groups of the Animal Kingdom, it is perhaps needless to premise that they have been conducted with the object of accumulating additional proofs of the validity of those views on the system of creation, the principles of which have been so amply detailed in the treatise "on the Classification of Animals," and illustrated by examples in that upon quadrupeds. The ornithological volumes of the same series, now in the press, will enable the unprejudiced naturalist to determine the truth or fallacy of these views; and whether my original propositions receive further confirmation in this most attractive department of nature. It is nevertheless impossible, upon a subject so vast, to enter into those minute details, in every instance, relative to each family, which should alone satisfy the philosophic inquirer: especially where the object of the treatises just alluded to is rather the condensation of results, than the detail of those facts upon which these results are grounded. Some few of the groups of ornithology have been analyzed in the Fauna Boreali-Americana, or Northern Zoology, and others will be laid before the public, for the first time, in the series above alluded to; but the limited extent of two volumes, to which the ornithological treatise is restricted, will oblige me to confine the elucidation of the greater portion of the families to a narrow compass. It is, therefore, with a view of supplying the necessary data for testing the soundness of the results there given, that I propose, in this publication, to treat of such groups more at large, rather wishing to lay before the experienced ornithologist the reasons upon which my opinions are grounded, than to have it supposed I wish those opinions to be received upon trust, without the production and evidence of facts.

I believe there cannot be the slightest doubt that the family of the *Cuculidæ* or Cuckoos, is the most aberrant family of the scansorial tribe. This conclusion may be arrived at by two ways, *first*, by considering the natural habits and structure of the birds themselves; and *secondly*, by ascertaining the relations of affinity which they bear to other groups, wherein the scansorial power is more developed. The first line of inquiry should always take precedence of the second; because, without understanding the history and structure of a bird, it is impossible to associate it with its natural companions. A rapid survey, therefore, of the chief peculiarities of the group before us, may precede a more minute inquiry into its contents.

The Cuckoos are altogether natives of such climates as lie beyond the influence of frost, and their number seems to be regulated by the proximity of their native country to the equator. Thus the ornithology of Europe presents us with only two species, both of which, during the summer, take up a temporary residence in latitudes otherwise cold, but which they hastily quit at the approach of autumn; and so congenial is warmth to their nature, that even the mild temperature of an Italian winter is not sufficient to retard their return to the sultry groves of Northern Africa. There is a fact regarding their structure, which appears connected with this susceptibility of cold, and which I believe has not hitherto been noticed. All the Cuckoos, both of the old and the new world, which I have had the opportunity of dissecting, are remarkable for the thinness and delicacy of their skins, so much so, indeed, as to render their preservation in an entire state, extremely difficult to inexperienced hands. Every one who has skinned the common British species must doubtless have observed this. On the other hand, as if to compensate for this delicacy of the cuticle, the feathers, more especially upon the back and rump, are unusually thick set and compact. Nor is this peculiarity of organization confined to the family before us, for we find La Vaillant observing the very same thing in respect to the *Ceblepyrinæ* of Africa, and nearly the whole family of pigeons have very thin skins, and thick set feathers. Nor are these relations of analogy without method, for on comparing the circles in which the *Cuculidæ*, the *Ceblepyrinæ*, and the *Colum-*

bidæ are respectively placed, it will be found that they mutually represent each other; all being tenuirostral types.

But after all, it is more than probable that the birds now before us are restricted to warm latitudes by the nature of their food, and not from any peculiar impatience of cold, arising from the above circumstances. The *Cuculidæ* are insectivorous and frugivorous, for they live both upon insects and fruits; the former habit, however, is not manifested by those bristles which are usually seen at the mouth of insect-eating birds, because the cuckoos only devour soft caterpillars; but the latter is manifested by their wide gape, the angle of the mouth being carried far backwards towards or even under the eye: this structure enables the jaws, or mandibles, to be very widely extended, and is a certain indication that such birds feed upon soft fruits, which are swallowed whole. From all this it is clear that the cuckoos, independent of other considerations, can only exist, permanently or temporarily, in warm countries, where insects and fruits abound; and we accordingly find that their geographic distribution has been so regulated.

So faintly is the scansorial structure indicated in these birds, that but for their natural habits, joined to the position of their toes, we should not suspect they were so intimately connected with the more typical groups of the tribe, as they undoubtedly are. They neither use their bill for climbing like the parrots, or for making holes in trees, like the woodpeckers, neither can they mount the perpendicular stems, like the Certhiadæ or creepers: and yet they decidedly climb, although in a manner peculiar to themselves. Having frequently seen different species of the Brizilian cuckoos (forming part of the genus *Coccyzus*) in their native forests, I may safely affirm that they climb in all other directions than that of the perpendicular. Their flight is so feeble, from the extreme shortness of their wings, that it is evidently performed with difficulty, and it is never exercised but to convey them from one tree to another, and these flights in the thickly wooded tracts of tropical America are of course very short: they alight upon the highest boughs, and immediately begin to explore the horizontal and slanting ramifications, with the greatest assiduity, threading the most tangled mazes, and leaving none unexamined. All soft insects inhabiting such situations laying in their route become their prey; and the quantities that are thus destroyed must be very great. In passing from one bough to another, they simply hop, without using their wings, and their motions are so quick that an unpractised observer, even if placed immediately beneath the tree, would soon lose sight of the bird. The Brazilian hunters give to their cuckoos the general name of *cats-tail;* nor is the epithet inappropriate, for their long hanging tails, no less than their mode of climbing the branches, gives them some distant resemblance to that quadruped. I have no doubt that the great length of tail possessed by nearly all the cuckoos is given to them as a sort of balance, just as a rope-dancer, with such an instrument in his hands, preserves his footing when otherwise he would assuredly fall. Remote, therefore, as the cuckoos unquestionably are from the typical *Scansores,* we yet find the functions of the tail contributing to that office, although in a very different mode to that which it performs among the woodpeckers, the parrots, and the creepers.

The structure of the feet, as before observed, is the only circumstance which would lead an ornithologist to place these birds among the climbers, supposing he was entirely unacquainted with their natural history, properly so called, or with their close affinity to the more perfect *Scansores.* The toes, indeed, are placed in pairs; that is, two directed forward, and two apparently backward, but a closer inspection will show that the latter are not strictly posterior, and that they differ so very materially from those of the *Picidæ,* (the preeminently typical family of the climbers,) as clearly to indicate a different use. The organization of the external posterior toe of all the woodpeckers, parrots, and toucans, renders it incapable of being brought forward, even in the slightest degree; whereas, in the cuckoos this toe can be made to form a right angle with that which is next it in front, from which circumstance it has been termed *versatile*: this term, however, is not strictly correct, inasmuch as the toe cannot be brought more than half way *forward,* although it can be placed entirely *backward.* Now this form, which is obviously the least developed state of the scansorial structure, accords exactly with the rank of the family, which is that of the most aberrant group in the circle, and furthest removed from the type. The cuckoos, in fact, are half-perching, half-climbing birds, not only in their feet, but, as we have seen, in their manners. No one, from seeing them alive, would suppose they were truly scansorial birds: and yet it is highly probable that this singular power of varying the position of one of their toes, gives them that quickness of motion, and firmness of holding, which accompanies the habits just mentioned.

There is another circumstance in the history of this family of birds which, with one solitary exception,* is altogether peculiar, as they contain the only parasitic birds yet known. This term, indeed, has been applied,—I think improperly,—to other genera, which, like the Frigate Pelicans, the jagars, and some of the eagles, rob other birds of their food; but this is a mere act of thieving, for all these feathered robbers can, and do habitually depend just as much upon their own industry in procuring food. But with the typical cuckoos the case is far different, for by depositing their eggs in the nest of other birds, to whom they leave the care of hatching their young and feeding them afterwards, they become as truly parasitic as any of the *Acari* or *Pediculi*; they fasten themselves, as it were, on another living animal, whose animal heat brings their young into life, whose food they alone live upon, and whose death would cause theirs, during the period of infancy. Such only is a parasitic animal, and such only, among birds, belong to the typical cuckoos, and their representative the *Molothrus pecoris.*

---

* Molothrus pecoris, see North. Zool. (the cow-bunting) of North America.

Such may be considered the leading or most typical distinctions of the family now before us, as furnished by that particular group which stands at the head, and of which our English species is a perfect example. As we descend more into detail, and investigate the peculiarities which distinguish the minor divisions, we shall find all those variations of structure and of economy which is to be met with in every other natural group of birds, following in the same uniform series as the primary types of the animal kingdom. Before, however, we proceed further, it will be satisfactory to show how perfectly the conclusion we have come to, on the aberrant rank of the family, is supported by the following table; wherein the five families of the *Scansores* are arranged under the three primary divisions of the tribe.

ANALOGIES OF THE SCANSORES OR CLIMBERS.

	Families of the Scansores.	*Typical characters.*	*Tribes of the Insessores.*	*Orders of Birds.*
1. Sub-typical circle,	PSITTACIDÆ,	Bill short, with a distinct notch or tooth,	DENTIROSTRES.	RAPTORES.
2. Typical circle,	PICIDÆ,	Bill lengthened, conic, nostrils covered with incumbent feathers,	CONIROSTRES.	INSESSORES.
3. Aberrant circle,	CERTHIADÆ,	Nostrils protected by a corneous scale,	SCANSORES.	RASORES.
	CUCULIDÆ,	Feet not strictly scansorial, very short, nostrils naked, tail.covers remarkably long,	TENUIROSTRES.	GRALLATORES.
	RAMPHASTIDÆ	Feet syndactyle, head and jaws large,	FISSIROSTRES.	NATATORES.

We see in this table a precision and harmony which is not to be found in any other yet published, for the rank of each group in the three columns is so preserved, that what is typical in one is also typical in the two others. Thus, for instance, the *Picidæ* or woodpeckers, which are the most perfect of all the climbers, are seen to represent the *Conirostres*, the most perfect of the perching order, and also the *Insessores*, which in like manner is the most perfect in the class of Aves. These analogies can be traced, in like manner, transversely, and arise as it were incidentally, without any derangement of the *perpendicular* series of affinities, by which the *Picidæ* follow the *Psittacidæ*, and these latter being succeeded by the creepers (*Certhiadæ*,) the cuckoos (*Cuculidæ*,) and the toucans (*Ramphastidæ*.) The affinities, in short, as expressed in the above table, are perpendicular, and analogies transverse. As some of these latter are very curious, we shall here notice them. Every one must be struck with the intimate resemblance which the bill of the parrots has to that of the shrikes, among the *Dentirostres*, and to the hawks, among the *Raptores*,—a resemblance which led to the old artificial arrangements, wherein the two groups are made to follow each other. Quitting these, we have the conic lengthened bill of the woodpeckers, representing the *Conirostres* in one column, and the *Insessores* in the other. The creepers (*Certhiadæ*,) as every one knows, are eminently scansorial birds, although they have three toes forward, and one backward,—like the *Rasores*,—and in both the tail is unusually developed, although in different ways. The *Cuculidæ*, as already demonstrated, are the most aberrant group of the whole, as this denomination implies that they are the most imperfect climbers. This latter conclusion, which we deduct theoretically from the situation we assign to this family, is borne out by the details already given. These birds, in fact, may be said rather to run than climb among the horizontal branches of trees, as the Grallatores are the swiftest runners on the ground; the cuckoos, moreover, have the very short feet of the *Tenuirostres*, and the very long tail-covers of the Grallatores. Lastly, the *Ramphastidæ* or toucans represent the natatorial type, the chief characteristics of which, as more fully explained elsewhere,* is great bulk, a large head, wide mouth, short tail, and imperfect feet: now all these peculiarities distinguish the toucans from the rest of the *Scansores*, and thus their analogy to the *Fissirostres* in the circle of the perchers, and to the *Natatores* in that of the orders of birds, is not only unequivocal, but most striking and remarkable.

I shall now point out in what manner I conceive these five subdivisions of the tribe unite among themselves, and form a circle of affinity, and I shall then endeavour to trace the same principle of circularity in such of the minor groups or sub-families as are most abundant in species.

---

* Classification of Animals.

Commencing with the *Picidæ* or woodpeckers, which are obviously the pre-eminent type of the scansorial birds, we see a gradual approximation towards the soft tail, the green, bright-coloured plumage, and the curved, toothed bill of the parrots in the barbuts (*Bucco,*) and the tooth-bills (*Pogonias,* L.) The first of these genera so much resemble the *Psittacidæ* in the style and similarity of their colouring that they might be taken for parrots, if their bills and feet did not evince an equal relation to the woodpeckers. The assertion of M. Temminck, that these birds do not climb,* is completely disproved by Mr Burchell, who assures me, from his personal observations, they have nearly the same scansorial habits as the *Picianæ,* —a fact confirmed, indeed, by the structure of their feet. Next to these we have the genus *Pogonias,* whose short, curved, and toothed bill brings us so close to the *Psittacidæ,* that one genus more would render the union of these families complete; although it is even now so obvious that no question can be raised on this point. Leaving the *Psittacidæ,* we enter among the toucans, by the green-coloured Aracaris, which have very properly been lately separated as a distinct group: these birds, in short, connect the toucans to the parrots in the same manner as *Pogonias* unites the parrots with the woodpeckers. It is thus we enter the family of the *Ramphastidæ* or toucans, the fissirostral division of the Scansores, where, as in all perfect fissirostral types, we have great bulk, a very large or wide mouth, and small syndactyle feet,—that is, with the toes more or less united. I may here advert to a fact in the economy of the toucans hitherto unpublished, and which gives an additional confirmation of their affinity to the *Psittacidæ.* Many, if not all, of the parrots, as it is well known, employ their hooked bill as an organ of prehension. My observations on the toucans of Brazil lead me to believe that they occasionally do the same, while climbing among the entangled foliage and branches in search of birds' nests, from which they greedily snatch either the eggs or the young. The Australian *Sythrops,* or channelbill, is a cuckoo, with the bill of a toucan; and thus we pass from one family to the other so gradually, that analysis alone can determine to which this singular genus belongs.

---

* M. Temminck gives no authority for this opinion, which must have been copied from other authors, he himself never having travelled out of Europe.

Saurothera follows Sythrops, and at once brings us among the genuine *Cuculidæ.*

All our best writers, without a solitary exception, have placed the honey-guides *(Indicator)* among the cuckoos, but by a singular oversight, they have overlooked the equally strong affinity which these remarkable birds possess to the African genus *Buphaga ;* or at least having perceived some relation (as evinced by the name of Indicator Buphagoides) between the two, they have fancied it merely analogical. The analysis, however, of this tribe, has convinced me that the two genera actually follow each other, and this will appear more evident on a subsequent exposition of the family of Certhiadæ, to which *Buphaga* directly introduces us. The short, robust bill of this latter genus is nearly preserved in the Australian *Orthonyx,* which, by means of the Brazilian genus *Sclerurus,* brings us at once among the typical *Certhiadæ. Sitta,* in this latter family, leads immediately to *Oxyrhynchus* in that of the *Picidæ,* the group, in fact, from whence we first began to trace the circle of the *Scansores.*

Having now sufficiently dwelt upon the station, in the circle of the scansorial birds, which the family under consideration appears to hold, we may at once proceed to the internal arrangement of the primary divisions of the family. Looking, therefore, to those genera which show the most prominent differences, I conceive that the whole are naturally arranged in the following divisions :

SUB-FAMILIES OF THE CUCULIDÆ.

Sub-families.	*Essential Characters.*	*Typical Genera.*
CUCULINÆ,	Wings long, more or less pointed, nostrils round,	CUCULUS, *Lin.*
COCCYZINÆ,	Wings short, more or less rounded; nostrils linear, base of the upper mandible dilated.	COCCYZUS, *Vieil.*
SAUROTHERINÆ,	Bill long, large, either serrated or hollow,	SAUROTHERA, *Vieil.*
OPISTHOCOMINÆ,...	Legs very long,.........................	OPISTHOCOMUS? *Hoff.*
INDICATORINÆ,......	Bill short, thick ; tail somewhat rigid,...	INDICATOR, *Sparm.*

The aberrant genera, which represent the sub-families, are few ; but they are sufficiently marked, as will subsequently appear, to point out their true rank and station. The two typical sub-families, on the other hand, are so diversified in their subordinate divisions or genera, that they may each be considered as perfect circles, thus adding another proof of the position so often verified, that typical groups are almost invariably more exuberant in species, and in modifications of form, than any others.

My first object will be to show in what manner these sub-families are united, so as to form a circle; or, in other words, to point out their *internal* affinities among themselves. I shall then slightly notice their *external* affinities, or those relations by which they are united to the conterminous families of the *Scansores*, that is, to the *Certhiadæ* on one side, and to the *Ramphastidæ* on the other.

First, as to their *internal* affinities. The progression from the *Cuculinae* to the *Coccyzinæ*, or from the parasitic to the building cuckoos, is so gradual, that our only difficulty is to discover the precise point of their junction, or, in other words, which is the scansorial type of each, for by these are all circles invariably united. One of these appears to be the Cuculus Erythropthalmus of authors. From the genus Coccyzus of M. Vieillot, the natural series passes into *Crotophaga*, by means of the Cuculus guira of Linnæus, ranked by some as a *Coccyzus*, and by others as a *Crotophaga*. By this genus, (the fissirostral type,) we leave the *Coccyzinæ* and enter the aberrant circle by means of the singular bird we shall subsequently describe, and which at the same time opens a passage to Phænicophaus: then follows *Leptosomus* and *Saurothera*, two remarkable genera, which all writers have kept together. After these, I am disposed to place the genus *Opisthocomus*, yet with a mark of doubt, not having at this time the opportunity of minutely examining certain parts of its structure. Whether or no the *Coccyzus Geoffroyi* of the Pl. Col. pl. 7, and the *Cocc. Delalandi* of the same work, Pl. 440, two birds nearly as remote from the type of the family as is *Opisthocomus*, really belong to this particular group, remains for future investigation. The last division is only represented by a single genus. This is composed of the well-known honey-guides of Africa: fortunately, however, the affinity between this and the genus *Eudynamys* is sufficiently apparent to leave us in no doubt that they follow each other, and by this affinity we once more return to the typical genus *Cuculus*, and close the circle.

The *external affinities* of the family will be found to strengthen what has now been said on its internal relations. The *Cuculidæ*, as being the most aberrant form of the *Scansores*, is consequently that by which the order *Insessores* is united to the *Rasores*,—the two other aberrant divisions, as before remarked, leading to the *Ramphastidæ* or toucans on one side, and to the *Certhiadæ* or creepers on the other. When we find the *Sauratheræ*, therefore, with large, serrated, and hollow bills, we see at once the mode in which nature has united the structure of a cuckoo with that of a toucan, while, on looking to the honey-guides, we detect indications of that rigidity in the tail-feathers, about to be fully developed among the scansorial creepers; the passage being further manifested by the honey-guides climbing with more facility than any other cuckoos. These two points of union I therefore consider as established; because they are further confirmed by well-known analogies, too decided to be questioned. Nor do I feel any considerable doubt on the situation of *Opisthocomus;* for whether this curious genus is the grallatorial type of the *Cuculidæ* or of the *Cracidæ,*—in other words, the last form among the *Insessores,* or the first of the *Rasores,* it certainly appears a form intermediate between the two orders, and bears every mark of being a grallatorial type, corresponding to *Gypogeranus.* As such I shall consider it, until farther discoveries demonstrate this opinion to be erroneous.

But before proceeding farther, it is essential to submit this series to the same analogical test we have applied to the primary divisions of the *Scansores.* For this purpose, I now offer the following table of the

Analogies of the Cuculinæ.

	1. Typical Group.	
Cuculinæ,	Bill somewhat conic, the sides thick and rounded,	Conirostres.
	Sub-Typical Group.	
Coccyzinæ,	Bill compressed; considerably arched from the base, the tip hooked,	Dentirostres.
	Aberrant Group.	
Saurotherinæ,	Seize their prey from a fixed station,	Fissirostres.
		Tenuirostres.
Indicatorinæ,	Bill short, thick, tarsus shorter than the outer toe	Scansores.

Where the prototype of a group, which in this case is the tenuirostral, has not been clearly ascertained, I have been accustomed in these analogical tables to leave a blank for its future insertion; contenting myself with expressing such opinions on the subject as appear, upon the whole, best supported by facts. This plan, it is true, is not calculated to impress superficial naturalists with a belief in those laws of natural arrangement upon which I have elsewhere expatiated; but it will, at all events, manifest that degree of caution in the application of a theory, which is so vitally essential to the progress of true science. For this reason I have not chosen to designate the tenuirostral type of this family, partly because I feel uncertain as to which of the forms already noticed, this title should be applied and, secondly, because it involves one of the most important affinities in the whole circle of ornithology; this being the point of junction between the insessorial and the rasorial orders.

But if, upon this question, we are obliged to suspend our judgment, the very singular and striking analogies which are manifest between the other four groups in each column leaves us without any doubt that their station, at least, is natural. The further, indeed, that the philosophic naturalist pursues his researches, the more will he be struck with wonder and admiration at the universality of a few general laws, simple in themselves, yet modified in such a manner as to produce the most inconceivable variety. In the present family this is so manifest, that the analogical characters above given might either be employed, with little variation, to designate the primary groups of the *Cuculidæ*, or those of the tribes of the order *Insessores*. Thus we see that the most conic billed cuckcoos are typical, and represent the conirostral tribe. Those which follow, of all others, have the bill *most* hooked and compressed,—these characters being also typical of the *Dentirostres*, The long-billed cuckoos of the genus *Saurothera* depart from the habits of all their family, since we are assured by eye-witnesses that they watch, like the fly-catchers and tyrant shrikes, for their prey from a fixed station, darting upon insects and lizards when they come within reach, and then return to their former seat, this habit being altogether peculiar to fissirostral types.

The honey-guides, independent of their possessing a tail whose feathers are more stiff than those of any other group in the family, exhibits one of the true characters of a scansorial foot ; that is, a tarsus so short, as to be greatly inferior in length to the outer or versatile fore-toe. This structure is a decided proof that the birds possessing it climb more in a *perpendicular* position than any other ; since it is carried to its maximum of developement in the two typical forms of the *Scansores*, the *Psittacidæ*, and the *Picidæ*. If, in short, the analogies of a group are correctly stated, they will bear comparison not only with every other in the same class of animals, but, as I firmly believe, with every other in the animal kingdom. There is a curious circumstance regarding the honey-guides which must not here be omitted. Upon what principle does this cuckoo, and this only, evince such attachment and familiarity towards man, as actually to call in his aid for procuring food ? The answer is deductable from the foregoing table. We have elsewhere shown that in every natural group one of the types is remarkable, above its congeners for its docility or its attachment to man, and that this type is the scansorial among the perchers, and the rasorial among birds. We may now add, that it is produced under a different form in the *Pachydermes* among the ungulated quadrupeds, and in the order *Ungulata* among the Mammalia. These relations, however, will be better comprehended by the following table, each column being viewed as a circular group.

Series of the Cuculidæ.	*Series of the Insessores.*	*Series of the Class Aves.*	*Series of the Class Mammalia.*	*Series of the Ungulata.*
Cuculinæ	Conirostres	Insessores	Quadrumana	Ruminantes
Coccyzinæ	Dentirostres	Raptores	Feræ	Solipedes
Saurotherinæ	Fissirostres	Natatores	Cetacea	Anaplotheres
	Tenuirostres	Grallatores	Glires	Edentates
Indicatorinæ	Scansores	Rasores	Ungulata	Pachydermes

It is not absolutely essential for the verification of an ornithological circle that its contents should be compared with those of other circles in a different class of the animal kingdom, yet where doubts may be reasonably entertained on one of the types, as in the present instance, it is highly expedient that the other four should undergo a very extensive comparison, and for this reason the reader will not fail to perceive that they are here submitted to a very searching and severe test,—a test, in fact, which sooner or later they must undergo,—or be rejected. Another reason, also, for introducing them in this place, is to call the zoologist's attention to the last set of analogies, or that which belongs to the Indicatores. By this we find that the attachment to man, and wonderful sagacity of the honey-guides, are represented by the parrot in the first column, the gallinaceous birds in the second, the ruminating animals in the third, and the elephant in the fourth, each being in its own series pre-eminently distinguished for social qualities. Further, I may observe, that this extraordinary property of the rasorial type can be traced through all those groups among the Annulosa, which I have as yet investigated; but, as this would involve us in an endless field of inquiry and demonstration, the subject cannot be pursued. There is, nevertheless, one analogy between the *Cuculidæ* and the *Annulosa*, which must be touched upon; since we should otherwise leave unexplained the most remarkable peculiarity attached to this family of birds: this, as before intimated, is in the parasitic nature of the typical cuckoos. We search in vain for analogous examples of this habit among these quadrupeds now existing, but on looking to the sub-kingdom *Annulosa*, and investigating the two typical classes of insects, (the *Aptera* and *Ptilota*,) we find that the following groups are all the most aberrant of their respective circles; and as this is the precise station of the cuckoos in the circle of the Scansores, it consequently follows, that they are all mutual representatives of each other.

Cuculus. *Vermes*, (pars) Lin.—*Pediculus.* *Acarus.*—*Stylops.*—*Cynips*, L.—*Chrysis*, L. Nearly the whole of the insects composing these groups, as every entomologist knows, are eminently parasitic; and, according to my researches, they actually occupy in their several circles, a situation precisely analogous to the *Cuculidæ* among the scansorial birds.

Four out of the five divisions of the family, so far as their analogies are concerned, have now, I trust, been sufficiently demonstrated. So that, whatever genus actually fills the interval between those of *Indicator* and *Saurothera,* we may feel pretty confident, that it would not affect the arrangement of the remaining types. These primary divisions of the *Cuculidæ* I shall consider as sub-families, to which, for the sake of so distinguishing them, I add the termination of *anæ*, to the name of what appears to be the typical genus in each. I must express my suspicion, however, that these sub-families are only equivalent to those groups called *genera* in the order of perchers. Our next inquiry will be directed to the contents of each of these sub-families, for the purpose of ascertaining the natural series of the genera, and we shall first examine the Cuculinæ or Genuine Cuckoos.

(To be continued.)

II.—*The Natural History of British Zoophytes.* By George Johnston, M. D. Fellow of the Royal College of Surgeons of Edinburgh. (Continued from p. 81.)

Pallas, who published at this period an admirable history of zoophytes,* was also the advocate of the Linnæan doctrine,† but he adduced no other facts than those furnished by Baster in its aid. He also adopted the opinion of Baster, who in this respect continued in opposition to Linnæus, that the true corallines (Corallina) were entirely of a vegetable nature, and his arguments on this head may be summed up as follows: In external appearance and structure a few corallines resemble some fuci, and many of them are like confervæ; they differ from other zoophytes in chemical composition, for, on being burned, they emit the smell of vegetable matter, neither do they contain a volatile salt or animal oil; the pores observable in their calcareous portion are too small to be the habitations of polypes, and similar pores can be detected on fuci; no polypes nor any visible token of life could be discovered by Jussieu in any coralline, a species of which, moreover, a Mr Meese had found growing upon a heath in Friesland; and lastly, the fructification of corallines is very similar to that of fuci and confervæ.

---

* P. S. Pallas, Med. Doct. Elenchus Zoophytorum sistens generum adumbrationes generaliores et specierum cognitarum succinctas descriptiones cum selectis auctorum synonymis. Hagæ-comitum, 1776.—" Princeps in hac classe opus."—Hall. Bib. Bot. ii. 566.

† " Didicimus in Zoophytis, sic jure vocandis, vegetabilem naturam cum animali ita misceri, ut vere anceps et dubia passim sit." &c. Elenc. Zooph. Præf. viii. It is because of its accordance with the hypothesis of a continuous series in the structure of organized beings, that Pallas mainly grounds his defence of the vegeto-animal nature of zoophytes.

Were these the deductions of correct observation and experiment they would unquestionably have been conclusive, but some of them were already known to be contrary to the fact, and the others were weakened with doubts and uncertainties. Ellis, conscious of his superior knowledge both of marine botany and zoophytology, put forth an answer to this attack which is remarkable for clear arrangement, and for candid and honourable bearing to his opponent, who had scarcely deserved this at his hand.* Having shewn that the presumed coralline which Pallas had compared to a fucus or sea-weed, was in fact a fucus, Ellis proceeded to prove how widely different every coralline was in structure and texture from any confervæ; and that the former, contrary to Pallas's assertion, not only gave out when burned " an offensive smell like that of burnt bones or hair," but afforded also on careful analysis both volatile alkali and empyreumatic oil.† " Doctor Pallas," Ellis continues, " proceeds to prove that corallines cannot be animals, as the pores of their calcareous substances are too minute for any polypes to harbour in. These words of the Doctor's seem to imply, as if the coralline substances were only habitations for detached polypes, and not part of the animals themselves. How this affair stands, I hope to have clearly demonstrated long before this, for I have plainly seen, and endeavoured to shew mankind, that the softer and harder parts of zoophytes are so closely connected with one another, that they cannot separately exist, and therefore have not hesitated to call them constituent parts of the same body, and that the polype-like suckers are so many mouths belonging thereto.

---

* It appears from the Lin. Corresp. Vol. i. p. 186, that Pallas had written disrespectfully of Ellis. In his Elen. Zoophytorum the latter, however, is profusely complimented :—" Ellisium subtilitate atque acumine observationum omnes super eminentem,"—Præf. p. x.—is praise enough surely, but its sincerity might be questionable.

† This character, as Lamouroux remarks, is insufficient, seeing that the major part of marine plants give out, in burning, odours and products analogous to those of animals.—Cor. Flex. p. 12. It is now well known that chemistry affords us, in its minute analyses, no test between animal and vegetable matter.—See Prout's Bridgewater Treat. p. 415, and more particularly Tiedemann's Comp. Physiology, p. 48, &c.

"Now, for the smallness of the pores, which the Doctor has mentioned here (among the Corallines) to be a contradiction to animal life; he certainly has forgot one circumstance, when he introduces the Corallium pumilum album, (Essay Cor. t. 27. f. *c*.) or his Millepora calcarea (Pall. Elench. p. 265,) as an animal, which is, that he there says, it has absolutely no pores at all.

"As there can be no doubt, but every part of what is called Coralline is necessary to make out such an animal, or being, it will be very difficult, if not almost impossible, to determine the proportion there ought to be between softer and harder parts; and therefore it cannot be thought unreasonable to say, that in some of this tribe the stony parts are by much the greater part of the whole, especially as Doctor Pallas's objection can be only against the crust, or lapidescent part, as the inside of many of them is far from being hard, being exactly like a Sertularia, so that I do not know if it would not be a good definition to one well acquainted with that tribe to say, a Coralline is a Sertularia, covered with a stony or calcareous crust; if the mouths should happen to be very small, their number may make up that deficiency. We see in the greatest number of corallines their surface full of holes; we saw the same in Escharas and Milleporas thirty years ago; since that time magnifying glasses have been improved, so as to shew us, that they are all orifices for polype-like suckers; why should not we now admit that glasses may be still more improved, so as even to make us able to see what may be the intention and use of these minute orifices, which according to all rules of reasoning, we must suppose to approach in nature to them they are most alike. From this extreme minuteness then of the pores of these Milleporæ, confessed to be zoophytes, as well as those of Corallina officinalis as before mentioned, it is no great matter of surprise, that Doctor Jussieu could not perceive any animal life in the corallines, nor Doctor Schlosser in the Millepora calcarea. As these experiments ought to be attended with many convenient coinciding circumstances that do not often happen to persons who only go to the sea side, perhaps for a few days or hours, so that it is unreasonable to conclude, because they have been unsuccessful, that more accurate observers may not be more fortunate at another time." —Having thus disposed of an argument which he could not distinctly answer, Ellis goes on to notice the fact of the coralline which had been found on Bergummer heath in Friesland, and which the vagueness of the manner in which the discovery was announced permitted or warranted him to ascribe to accident; and he then concludes his admirable essay with a faithful and minute account of the fructification of the confervæ, and proves to a demonstration that when Baster and Pallas attributed a similar fructification to corallines, they had very erroneous ideas of the subject.*

The discussion rested here, and zoophytes, including the sponges and corallines, have been ever since enumerated among the subjects of the animal kingdom, although some, among whom Spallanzani may be particularized, continued in the belief that the corallines and the sponges were vegetables. But naturalists continue to be divided in opinion relative to the nature of acknowledged zoophytes, for many still speak of them as intermediate beings partaking of a twofold nature, while others defend their claims to pure animality. No new doctrine has been promulgated; neither indeed have the old been defended or attacked by any other facts or arguments than those already referred to, and with these before me I cannot hesitate to give my assent to the opinion of Ellis. No one denies that the polypes considered abstractedly from their polypidoms are really animals;—their quick and varied movements,—their great irritability,—the existence of a mouth and stomach,—the nature of their food, its digestion, and the evomition of the indigestible remains are incontestible proofs of this;—and it seems improbable, to say no more, that this animal should be fitted round with a case that grew independent of it and from a different cause. And the case itself has no analogy, as Ellis shewed very clearly, either to bark or to wood: it possesses the structure of neither of them, nor is it formed in the same manner by the addition of concentric layers, nor does it contribute to the formation of new parts, but, like the shell of testaceous mollusca, it is extravascular and inorganic, and when once formed suffers no other change than what external injuries or time may operate. If possible its coincidences with the skin of cellular plants are even fewer: the one is a living part which has very important functions to perform in relation to the plant itself and to the atmosphere or circumfluent medium in which it lives; the other exhibits no action characteristic of life, and is nothing more than a condensed albuminous or calcareous sheath, appropriated solely to support or protection.*

---

* Phil. Trans. Vol. lvii. p. 404, &c.—Pallas appears to have been convinced by this essay that the Corallines were animal; and he acknowledged that in reference to the land species he had been imposed on.—Lin. Corresp. i. 227, and 568. Yet it should be remembered that Captains Vancouver and Flinders observed on the shores of New Holland, at considerable heights above the level of the sea, arborescent calcareous productions which they considered to be corals. Peron says they are either corals or vegetables incrusted with calcareous matter; and Dr Clarke Abel has pıoved that they are the latter.—Edin. Phil. Journ. ii. 198.

But although I agree with the advocates of the animality of zoophytes in general, I cannot go the length of Ellis in considering it proved that sponges and corallines belong to the same class. Ellis, we have seen, knew that no polypes were to be found in sponge, and their existence in the pores of corallines was inferred merely from the structure of these and their chemical composition. They have been examined by subsequent naturalists fully competent to the task, and under the most favourable circumstances,—in particular by Cavolini and Schweigger,—and the result has been a conviction that these productions are truly apolypous. Now this fact, in my opinion, determines the point, for if they are not the productions of polypes, the zoologist who retains them in his province must contend that they are individually animals, an opinion to which I cannot assent, seeing that they have no animal structure or individual organs, and exhibit no one function usually supposed to be characteristic of that kingdom. Like vegetables they are permanently fixed,—like vegetables they are non-irritable,—their movements, like those of vegetables, are extrinsical and involuntary,—like cryptogamous vegetables or algæ they usually grow and ramify in forms determined by local circumstances, and if they present some peculiarities in the mode of the imbibition of their food and in their secretions, yet even in these they evince a nearer affinity to plants than to any animal whatever.

II.—ON THE STRUCTURE AND FUNCTIONS OF THE POLYPES ABSTRACTEDLY CONSIDERED.

On the continent the term *Zoophyte* has of late been used in a very extensive sense, so as to include every animal which exhibits a circular disposition of parts radiating from a common centre, and many also in which this character is little or not at all obvious. In this country the word has never been so employed excepting in translations from a foreign language: no English writer ever thinks of calling an intestinal worm, or a sea-jelly, or a star-fish, or even the infusory animalcules, a zoophyte; but he applies the name to no other creatures than those which in their form, or most remarkable characters, recall the appearance of a vegetable or its leading properties. In this restricted sense I also use it in these essays, or rather with a still narrower circumscription, having assigned what appear to be sufficient reasons for removing the corallines and sponges from the category, and restoring them to the vegetable kingdom, to which the earlier naturalists believed they had a rightful claim. The definition of a zoophyte is thus considerably simplified, but there remains sufficient variety and discrepancy in the constituents of the order to render that definition in some degree vague and incongruous. The fact is—the classification of molluscous, and radiated, and acritous animals requires to be recast: the limits between them have not been determined with undisputed precision, and it seems probable that there are in each class some tribes which will pass from one to the other as discovery proceeds. It has been recently proposed* to remove a large proportion of zoophytes hitherto considered legitimate subjects of their order to the mollusca, which, about the year 1815,† had received a considerable accession to its numbers from the same source; but so far from acknowledging the propriety of the proposed translation, I incline to agree with Lamarck‡ that it would be better to separate again the colonized zoophytes from the mollusca, and form with them, and with such zoophytes as have an analogous organization, a distinct class, to occupy the wide interval between the molluscan and radiated types, allied to the former by the non-symmetrical figure of the body, and to the latter by the circularity of the oral members. It is, however, unnecessary to enter here upon this discussion, for my intention is to describe what are usually reckoned zoophytes, without having regard to the naturalness of the group considered as a whole, and with this view I adopt the class as it was long ago established by Solander and Ellis, excepting only the corallines and sponges, which will form the subject of separate monographs. The following definition may serve to characterize the class:

---

* I do not enter into the question whether the Confervæ are real animals or not, because, whatever conclusion we might adopt, they would not come within our definition of a zoophyte or polype, since they assuredly have neither mouth, tentacula, nor stomach. Nor need I discuss the propriety of instituting, with Treviranus, a fourth kingdom of animated nature, composed of the zoophytes and aquatic cryptogamia, as my object and plan is only to describe what have been almost universally considered zoophytes.

Animals avertebrate, inarticulate, soft, irritable and contractile, without a vascular or separate respiratory or nervous system: mouth superior, central, circular, edentulous, surrounded by tubular or more

---

* Thompson's Zoological Researches and Illustrations, p. 92.

† Savigny's Memoires sur les Animaux sans Vertebrès. Seconde Partie. Paris, 1816, 8vo.

‡ Hist. Nat. des Anim. s. Vert. iii. 82—87.

commonly by filiform tentacula: alimentary canal variable,—where there is an intestine the anus opens near the mouth: assexual; gemmiparous: aquatic.—The individuals (Polypes) *of a few families are separate and perfect in themselves, but the greater number of zoophytes are compound beings, viz. each zoophyte consists of an indefinite number of individuals or polypes organically connected and placed in a calcareous, horny or membranous case or cells, forming, by their aggregation, corals or plant-like* Polypidoms.

In this definition there are two parts which require our particular attention—the *Polype* whose presence is essential, and the *Polypidom,*[*] which is the house or support of the polype, and which, though commonly present, is yet not necessary to the existence of a zoophyte. To the structure and functions of the former we limit ourselves in this chapter; and should the reader find the outline given in relation to some of the families too slight and sketchy, we may advertise him that he will find it filled up with greater detail in the observations which it is intended to prefix to each separate order.

The description usually given of the structure and functions of polypes in general has been derived principally from an examination of the Hydra—a naked species which inhabits ponds and ditches. A polype is thus represented as being a somewhat globular or cylindrical body of small size, of a homogeneous gelatinous consistence, and very contractile, in the centre of which there is excavated a cavity for the reception and digestion of its food. The aperture to this cavity is placed on the upper disk of the body, and is encircled by one or two series of filaments or tentacula which are used to capture the necessary prey, and bring it within reach of the lips; while the opposite end serves the purpose of a sucker to fix the creature to its site, or being prolonged like a thread down the hollow sheath, to connect it with its fellow-polypes of the same polypidom, which by this means become compound animals, "the whole of whose parts are animated by one common principle of life and growth." There are no organs of sense, no limbs appropriate to locomotion, no circulating vessels, no nerves, nor lungs, nor gills, no chylopoetick viscera, nor intestine, for there is "but one conduit both for purgation of their excrements, and reception of their sustenance;" and when to these negations there is to be added the want of generative organs, a being of simpler organization than the polype can scarcely be conceived; and, perhaps, it is actually the simplest, for the infusory animalcules which had been placed underneath them in the scale of organization, are now known to possess a much more complex structure.

---

[*] I borrow this term from the translator of Lamouroux's work on Corallines. The Rev. Mr Kirby uses the word *Polypary* to express the same thing. Both of them are translations of the *Polypier* of the French naturalists.

Such is the idea of a polype we obtain from the writings of Ellis, and the description of its general structure given by Lamarck,* after an interval of seventy years, is identically the same. Some few species, classed by the predecessors of the latter among zoophytes, had in the meantime been ascertained to be differently constructed, and furnished with less simplicity, but being in consequence removed into a different category, they were not allowed to disturb the received opinions on polype anatomy. Still more recent discoveries have shown, however, that these are very erroneous, and that the animals of even our native polypidoms form at least two classes distinguished by a very remarkable dissimilarity of organization. By the one they are allied to the tunicated and acephalous mollusca, more especially to the compound families of the former, and hence may be denominated *Ascidian* polypes; by the other they form a link of the chain or circle which associates the radiated animals, and, assuming the hydra, for their representative, we shall call them *Hydraform* polypes.

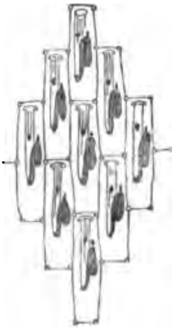
The ascidian polypes never occur in a separate and naked form, but are always placed within the cells of a polypidom of a calcareous, membranous, or fibro-gelatinous consistence. The form of the cells in many genera, as Eschara, Flustra and Cellepora, suggests a belief that their tenants, although arranged in a close and determinate manner, are each separate from their neighbours and complete in themselves, and this opinion is held by some of our best naturalists; but the observations of Professor Grant seem to have proved that the polypes of the Flustra are connected together by a living axis, and are hence truly compound beings; and since the Vesiculifera, which are admitted to be composites, belong unquestionably to this remarkable form of animated entities, it is safer, for the present, to consider all the ascidian as compound polypes.* There is nevertheless a remarkable difference between them and the hydraform tribes in their mode of composition. In the latter the polypes are simply developements of the common central fleshy mass, identical with it in structure and texture; in the former each individual is a distinct organism, and the medium which binds them together, whether vascular or ligamentous, has its own peculiar character. The one we may compare to a chain of which all the links are welded,—the other to a necklace where the beads are strung together by a percurrent thread. To express this distinction we shall call the hydraform *compound* polypes, and the ascidian *aggregated* polypes.

---

* Anim. s. Vert. ii. 10. Bosc, Vers, ii. 216.—Lamouroux in 1810 and 1812 had indeed asserted that the polypes with polypidoms could not, in relation to their structure, be compared with the fresh-water hydra, but that they approximated nearer than was believed to the mollusca, of which they might at some future time be considered a family. The opinion certainly rested on few and hasty observations, and no anatomical details were given in its support. See his Edit. of Soland. Zoophyt. pref. p. vii. For example, he not only recognizes a relationship between Lobularia and Actinia, but he tells us that the polypes of the Flustræ, Cellariæ and Sertulariæ are similar to those of Lobularia! Coral. Flex. p. 332. Such loose observations as these are have no influence on the progress of discovery. The observations of Savigny were evidently more specific and correct; but I am not aware that the details have been yet published.—See his Mem. sur les Anim. s. Vert. ii. p. 65.

The body of the ascidian polypes is lengthened, somewhat cylindrical or at times bulged at the base, and when at rest lies, in the form of a syphon, doubled up upon itself in the cell, (Fig. 1, †) to which it is connected by a tendon at the bottom, and by the duplicature of a thin membrane round the aperture, so that it is impossible it should ever voluntarily leave the cell to swim at large, as Baster and others have maintained. The head or upper end is surrounded by a single row of tentacula, (Fig. 2, *a*,) which are solid, filiform, and non-contractile, for the animal can only shorten them by rolling them up in a spiral manner: they are apparently smooth, but with a high magnifier it is ascertained that they are clothed with numerous fine cilia,‡ which are in ceaseless

Fig. 1.



---

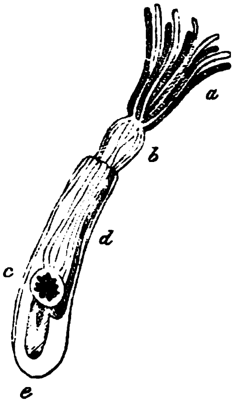
* "The polypi are most intimately and inseparably connected with the *axis* by three parts of their body, and are only digestive sacs or mouths developed by the axis, as in all other zoophytes, for the nourishment of the general mass. By the *axis* of a zoophyte, I understand every part of the body excepting the polypi, whether of a calcareous, horny, or fleshy nature. The exact mathematical arrangement and forms of the cells of Flustræ is incompatible with their existence, as separate and independent beings, but is quite analogous to what we are accustomed to observe in Cellariæ, Sertulariæ, Plumulariæ, and many other well-known compound animals."—Grant in Edin. New Phil. Journ. iii. 116. See also Blainville, Man. d'Actinologie, p. 99.

† The figure represents the polypes of Flustra membranacea in a state of retraction.

‡ The Rev. Dr Fleming is the first who discovered this structure and its important use in creating respiratory currents.—See Wern. Mem. iv. 488–9. The

motion, and are supposed to perform the office of breathing organs by keeping up a constant current of water along their surfaces, which sets in towards the mouth in an invariable direction; and from the incessant revolution of particles within the mouth and the gullet, observed by Professor Grant, this organ seems to be also ciliated internally. The more especial use of the tentacŭla is to arrest the prey which chance floats within their reach and conduct it to the mouth,—a simple aperture placed in the centre of the tentacular circle, and which is armless, having in no instance either jaws or teeth. It is the entrance into a long membranous gullet (*b*,) of perfect transparency, and which can be traced through its equally transparent envelope, to its termination in a somewhat globular and comparatively large organ placed near the curvature of the body, and rendered opaque partly by the greater thickness and fleshiness of its structure, but perhaps more so by the nature of its contents. This is the stomach (*c*,) and from the side of it there proceeds a narrow intestine (*d*,) which follows a straight upward course along the side of the gullet, and opens at the aperture of the cell by a separate orifice from which the undigested remains of the food are ejected. There is another organ of a roundish figure appended to the bend of the intestine, which is supposed by some to be an ovarium (*e*,) but it seems not unnecessary to remark, that this appropriation of it to the generative function has perhaps no better proof than what is derived from a similarity of position between it and the supposed ovarium of the compound mollusca. It is, I presume, the organ which Blainville says he is willing to believe performs the functions of the liver,* an opinion in which I am disposed to concur.

Fig. 2.



No trace of a nervous or vascular system of any kind has been detected, nor is there any organ of sense, but the polypes are notwithstanding very sensible of external impressions.† When

---

currents had been previously observed, but had been attributed erroneously to the movements of the tentacula.

* Manuel d'Actinologie, p. 72.—Fig. 2 represents the polype of Vesicularia imbricata highly magnified. It is copied from Thompson's Zool. Ill. Memoir, v. pl. 1, fig. 4.

† "But as we perceive, in these animals, phenomena which take place by the medium of nerves in animals of a more elevated order, that is to say, sensi-

left undisturbed in a glass of fresh sea water, they push their tentacula beyond the mouth of the cell by straightening the body; and then expanding them in the form of a funnel or bell, they will often remain quiet and apparently immoveable for a long time, presenting a very pretty and most interesting object to an observer of "the minims of nature." If, however, the water is agitated they withdraw on the instant, probably by the aid of the posterior ligament or muscle;—the hinder part of the body is pushed aside up the cell, the whole is sunk deeper, and by this means the tentacula, gathered into a close column, are brought within the cell, the aperture of which is shut by the same series of actions. The polypes of the same polypidom often protrude their thousand heads at the same time, or in quick but irregular succession, and retire simultaneously or nearly so, but at other times I have often witnessed a few only to venture on the display of their glories, the rest remaining concealed; and if, when many are expanded, one is singled out and touched with a sharp instrument, it alone feels the injury and retires, without any others being conscious of the danger, or of the hurt inflicted on their mate.

Of the hydraform polypes a sketch of their anatomy has already been given in the beginning of this chapter. They differ from the ascidian in their figure, which is somewhat globular or cylindrical and straight; in the position of the body, which is vertical; in the homogeneity of their composition, which is a semitransparent glairy gelatine, full of microscopic coloured granules;* and very remarkably, in being

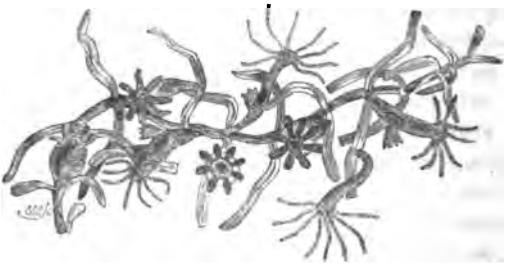
---

bility and voluntary motion, it is not improbable that in them the nervous substance is mixed with their gelatinous or mucous mass, without being demonstrable as a particular tissue."—Tiedemann's Comp. Phys. p. 64.

[*] Trembley having ascertained that the colour of the polype resides in these granules, and that it varies with the quality of their food, of which the nutritive part or chyme passes first into the granules of the stomachal cavity and then gradually into those placed more towards the surface, infers that they are a kind of *glands* or rather *vesicles*, which have the power of sucking in and again transpiring the nutritive fluid.—Hist. des Polypes, p. 132. Lamarck adopts this opinion, Anim. s. Vert. ii. 9, which is probably correct, but it ought to be remembered that it is somewhat hypothetical. Consult in relation to this subject Roget's Bridgewater Treatise, Vol. ii. p. 77–8, Carus' Comp. Anat. Eng. Trans. Vol. i. p. 25, §. 23; and the reader will find Edwards' and Dutrochet's opinions on the nature of the elementaty corpscules in Bostock's Elementary System of Physiology, Vol. iii, p. 348 et seq. Tiedemann sums up our *actual* knowledge in the following sentence.—"In animals of a simple structure, polypi, entozoa, and some others, in which no vascular system for the movement of the humours has hitherto been discovered, the nutritious assimilated liquid passes directly into the parenchyma of the body, with which it enters into combination."—Comp. Physiology, p. 35.

contractile at every point, so that they can change the figure of their bodies from a globe to a cylinder, or distort it with strictures, and can shorten and extend the tentacula at will, sometimes to an extent which is astonishing, although nothing like muscular tissue can be detected in their structure.* When therefore they have occasion to conceal themselves within their cells, they are not necessitated, like the ascidian, to bend the body in order to obtain sufficient space for the tentacula, but they shorten the body and the tentacula at the same time, causing the one to assume a more globular form, and the other to dwindle down to mere knobs or papillæ (Fig. 3.)† The tentacula, even when fully extended, have not the same appearance,—they taper a little, and are roughened with minute warts generally arranged in an imperfectly verticillate fashion, and in their evolution they are less regularly campanulate, one or more being usually in action and moving from the outline of the circle. The stomach is not a distinct sac, but a simple cavity towards the centre of the body, " neither figured nor limited by particular membranes," and from which the indigestible remains of the food are ejected at the same aperture by which it had entered, for the aperture in the base of the stomach or intestine seems to be appropriated to other offices. And in reference to its relation with the polypidom there is this difference,—the hydraform polype is not connected with the cell by any membrane or ligament, but rather sits free within its miniature cup, retained there only by the gelatinous living pedicle which is prolonged from its base down the sheath, and binds all the polypes of the polypidom in one sympathising family.

Fig. 3.



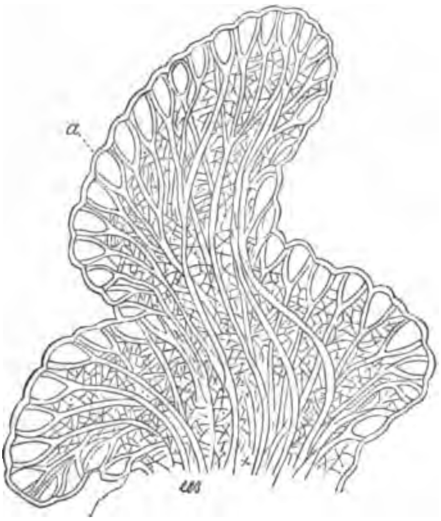
But this description is applicable only to the Hydra itself, and to those compound species which tenant the cups of the plant-like polypidoms embraced in the order Zoophyta hydroida. The polypes of the asteroid zoophytes, although evidently modelled on the same type, have made considerable advances towards complexity of organization, and their relation to the polypidom is entirely altered. Hitherto the polypidom has been, what its name imports, a cell for retreat in danger, and in ordinary an extravasular insensible sheath to protect the contained animal from the rude contact of the circumfluent element; but now we find it occupying an internal position, and instead of a covering it has become a sort of prop or skeleton to a fleshy crust in which the polypes are immersed. In the Alcyonium this interior support is scarcely to be recognized in some calcareous spicula scattered through the central mass, but in Pennatula it forms a bone stretched like a vertebral column from one extremity to the other, and in Gorgonia it is ramified into branches after the manner of a tree. It is this axis, under whatever shape it appears, which is the true analogue of the polypidom of the ascidian and hydraform polypes, although the name certainly has no suitableness here, for the polypes cannot only not nestle in that which is uncellular, but they have no immediate connection with it. They, as already mentioned, are found lodged in a sort of cell (Fig. 4. *a.*) excavated in an exterior sarcoid crust, which constitutes the main bulk of the polypiferous mass, and which, in fact, is nothing more than a production of the bases and outer skin of the polypes hardened by a deposition of calcareous granules and spicula, and made more coriaceous in texture, to bear with impunity the contact and ruffling of the water.* This crust is accordingly a living irritable structure, permeated by tubes prolonged from the po-

---

* Trembley, Mem. pour l'hist. des Polypes, p. 25. Carus' Comp. Anat. i. p. 43.

† The figures represent Hydra viridis in various attitudes and states.

Fig. 4.



---

* "Lorsqu'on observe les Alcyons dans leur état naturel, la ligne de démarcation entre ces deux parties paraît bien tranchée, et on pouvrait au premier abord, croire ces petits animaux logés dans des cellules au pourtour de l'ouverture desquelles ils adhereraient; mais quand on elève à l'aide d'un acide étendu d'eau,

lypes and by capillary canals, for the conveyance of water and nutriment to every part.

The connection between the crust and the polype is therefore of the most intimate kind, and if for conveniency the latter are separately described, the reader should ever remember, that this separation is a forced and artificial one. An asteroid polype mass is known by the orifices of the cells forming on the surface a mark more or less resembling a star, as this is painted in maps—hence the name of the order: when the polype is protruded from this cell the body has a cylindrical figure, its upper disk surrounded by eight short pectinated hollow tentacula, in the centre of which the mouth is situated, leading into a distinct stomach, which is as it were suspended in the centre, and sustained there by eight thin membranous septa, which, stretched between the outer surface of the stomach and the inner surface of the external tunic, divide the intervening space into eight equal compartments. The base of the stomach is perforated like the mouth, and from the margin of the aperture depend eight white tortuous filaments, which hang, either loose or connected to a continuation of the membranous septa, in a wide abdominal cavity, immediately underneath the stomach. This cavity is again continuous with a tube which penetrates the common mass, communicating freely by anastomoses with the tubes of other polypes, and with a fine net-work of capillary vessels, formed in the spaces between them, by means of small apertures in their walls. (Fig. 4. *) In this manner there is effected a very free communication between the individuals of each common mass, so much so, that the water swallowed by any one polype of it rapidly permeates the whole. † By tracing the course of the fluid we may obtain a clearer view of the organization. The water then enters the mouth, and passes through the cylindrical gullet and stomach into the abdominal cavity: thence part of it, flowing through the canals formed by the septa stretched between the stomach and outer tu-

---

le dépôt calcaire dont la base du polype est environnée, on voit qu'il y a entre ces parties continuité organique, et que la cellule polypifère n'est autre chose que la portion inferieure du corps du polype qui, en se contractant, rentre en luimême, comme nous l'avons dejà vu pour les Alcyonides. Le polypier commun n'est en effet autre chose que la résultat de l'aggrégation intime de la portion basilaire des polypes." Milne-Edwards in Ann. des Sc. Nat. iv. 336. an 1835. The student may compare this with Lamouroux's description of the Gorgonia. Corallina, p. 198.

* A longitudinal section of Alcyonium digitatum.

† Milne-Edwards has proved this by a decisive experiment.—Ann. des Sc. Nat. iv. 328 and 338, an 1835.

nic, passes into the tentacula with whose cavity the canals are continuous, and by means of small apertures in the sides of the hollow tentacula, the water penetrates and unfolds the cilia, with which these tentacula are fringed. By the distension from the water thus introduced, the body of the polype and its tentacula are forced beyond the surface, and every organ fully displayed. Another portion of the water in the abdominal cavity passes into the tube continuous with it, fills it and the others in connection with it, and by means of holes in their parietes finds access into the intermediate capillary net-work, so that the whole mass is permeated with the fluid, and all and every portion distended to a bulk which may be more than double of that which it had previous to the introduction of the fluid, and which it resumes when, from the application of irritants, the polypes contract themselves, and by their contractions force out all the imbibed water.—The tortuous filaments suspended from the base of the stomach have been generally taken for ovaries, but the observations of Dr Grant and M. Edwards seem to have disproved this opinion. The latter of these eminent naturalists believes them to be analogous to the biliary canals of insects. *

The affinity in structure between the asteroid zoophytes and those which we name *helianthoid,* from their resemblance to some compound flowers, is evident, although in the latter there is a still further recession from the simplicity of polype anatomy. We find in them a mucous coat covering the surface,—beneath it a layer of transverse submuscular fibres, while the body is supported by numerous strong cartilaginous lamellæ arranged in longitudinal parallelism. Each of the lamellæ is attached inferiorly to the circular layer which constitutes the base of the animal, and divides into three fascicles,—one which goes to the stomach and to the rim of the oral aperture,—another to the roots of the tentacula,—and the third is prolonged to the outer labial border, where it is bent back to form its free margin.† The stomach has its distinct and proper parietes; there are special organs for the developement of the reproductive gemmæ; and even some traces, as is asserted, of a nervous system; while the numerous tentacula are perforated like canals, in order that the water of respiration may be introduced into the interior, and the nutritive fluids more thoroughly influenced by its oxygen.

It has been mentioned already that there is no proper circulation—no movement of a fluid analogous to blood in appropriate vessels—in any zoophyte, but in many of the hydroida it has been discovered that there is a continuous and uniform current of a fluid, containing granular bodies which have themselves a rotatory motion, within the tubular portions of the horny polypidom. Cavolini first detected this sort of circulation, which is very similar to what has been observed in the Chara and other plants, in the Sertularia; and recently Mr Lister has confirmed this discovery, and ascertained the existence of the same phenomenon in almost all the genera of the order. The result of his curious observations is thus summed up by Dr Roget. "In a specimen of the Tubularia indivisa, when magnified one hundred times, a current of particles was seen within the tubular stem of the polype, strikingly resembling, in the steadiness and continuity of its stream, the vegetable circulation in the Chara. Its general course was parallel to the slightly spiral lines of irregular spots on the surface of the tube, ascending on the one side, and descending on the other; each of the opposite currents occupying one-half of the circumference of the cylindric cavity. At the knots, or contracted parts of the tube, slight eddies were noticed in the currents; and at each end of the tube the particles were seen to turn round, and pass over to the other side. In various species of Sertulariæ, the stream does not flow in the same constant direction; but, after a time, its velocity is retarded, and it then either stops, or exhibits irregular eddies, previous to its return in an opposite course; and so on alternately, like the ebb and flow of the tide. If the currents be designedly obstructed in any part of the stem, those in the branches go on without interruption, and independently of the rest. The most remarkable circumstance attending these streams of fluid is, that they appear to traverse the cavity of the stomach itself, flowing from the axis of the stem into that organ, and returning into the stem, without any visible cause determining these movements." *

---

* Ann. des Sc. Nat. iv. 331; an 1835.

† Blainville, Man. d'Actinologie, p. 68.

This sort of circulation is not to be confounded with those aqueous currents which flow over the surfaces of the external organs of the ascidian polypes. † It has been already stated that in-

---

* Bridgew. Treat. Vol. ii. p. 233. See also Tiedemann's Comp. Physiol. p. 150. and Ent. Mag. Vol. iii. p. 174.—Dr Sharpey appears to have discovered that the currents are produced by vibratile cilia.—Edin. New. Phil. Journ. for July 1835.

† Dr Grant repeatedly asserts that the tentacula of the hydraform polypes are also ciliated, and I would not have dared to controvert this statement, although my own observations had long ago satisfied me of its incorrectness, had it not been at variance with the observations of others who have especially directed their attention to the subject. Raspail states that he was not able to discover

numerable cilia or miniature lamellæ clothe the surfaces of their tentacula, and by their rapid vibrations drive a constant equable stream of water along one side, which returns along the other in an opposite direction; and by this means the purposes of respiration are effected, and the nutrient fluid fitted for assimilation with the body. The cilia, to adopt the language of Professor Grant, "are disposed and moved in such a manner as that the streams which they produce in the surrounding water are driven along the one side of the tentaculum, from the mouth of the polypus, and on the other side of the tentaculum always towards the mouth of the polypus. And we never find that direction of their motion reversed, or that direction of the currents changed, by which their respiration is effected, and their food obtained. They are vibratile on the arms of most of the lower zoophytes, as sertulariæ, plumulariæ, serialairæ, cellariæ, flustræ, alcyonia, which keep their arms stiffly out in a regular campanulate form, while the currents flow to their mouth. When we watch the sides of the tentacula of these animals with attention, and by the aid of powerful glasses, we see the extreme rapidity of the movements, and the remarkable regularity of the form, disposition, and motions, of those singular vibratile bodies. From the number of them, exceeding sometimes 400,000,000 in a single animal, it is not probable that their extraordinary movements are the result

---

anything analogous to cilia on the tentacula of the Hydra; (*Org. Chem.* p. 293,) and Dr Sharpey says, that in the form of polype "which exists in most true species of Sertularia, Campanularia, and Plumularia, and in allied genera, *the tentacula or arms are destitute of cilia, and incapable of giving an impulsion to the water.*"—Cyclopædia of Anat. and Physiology, Vol. i. p. 611.

Raspail maintains that there are really no cilia, but that the appearance of them is occasioned by currents of fluid aspired or drawn to and within the body, and expired or driven from it, and these currents are said to be produced by the difference of temperature between the fluid in the body and exterior to it. "A happy conjecture led me to consider these vibratory cilia as being merely streams of a substance either inspired or expired, but at any rate of a different density, and consequently of a different refractive power from the surrounding medium." P. 293.—"The cilia of a respiratory organ are, then, the effect of a difference of density between the water expired, and that in which the animal swims. Now there is no difficulty in admitting that, since caloric is disengaged in the respiration of animals of a superior order, it may also be disengaged, although, if we may so speak, in a microscopic proportion, during the act of expiration in the Infusoria and the Molluscæ. The difference, then, between the density of the water expired and that of the surrounding water, proceeds from a difference of temperature." P. 297. This explanation of Raspail's is completely disproved by the observations of Professor Grant on the Beroe; (Trans. Zool. Soc. i. p. 11.) and of Dr Sharpey on numerous animals.—Edin. New Phil. Journ. July 1835.

of any spontaneous efforts of the animal, or are accompanied with any kind of perception or consciousness in these animals, which have never been found to present a single nerve in their bodies. The independent nature of the motion of those minute respiratory organs is observed when we cut off the tentacula altogether; and observe, that they still continue the rapid vibration of their cilia; and though severed from the polypus, the tentacula continue to move forward through the water; the severed tentaculum of a flustra is seen to swim through the water like a worm. The number of those organs varies much; they are eight in Serialaria lendigera, and in Plumularia falcata, fourteen in Cellaria avicularia, twenty-two in Flustra carbasea. The effect of those motions of the cilia again is obviously to change the stratum of water constantly in contact with the most delicate fleshy parts of those zoophytes, with the highly organized soft irritable fleshy polypi. Thus they aerate the cellular texture of their body, at the same time that they bring the animalcules—their ordinary food—within the grasp of the tentacula."*

All polypes—ascidian and hydraform—subsist on animal matter, and probably only feed upon it in a living state. The smaller species seize on worms and animalcules brought accidentally within reach, or carried into the vortex formed by the play of the tentacular cilia: the larger kinds (Helianthoida) swallow small crabs and shelled mollusca, rejecting the shells after having sucked out the soft contents. The food, in the Hydroida, is dissolved and necessarily made chylous in the stomach, and directly absorbed from it; but in the ascidian it is probable that the process of chylification is not completed until the food has passed into the intestine. In the higher animals the chyle is mixed with the blood and exposed to the influence of atmospherical air before it is fitted for assimilation and growth; and though bloodless this air is no less necessary to the growth and existence of polypes, which soon languish and die in vessels of unrenewed water. Hence the current within the tubes of some polypidoms which has been noticed: it is the movement of the nutrient fluid which has found its way from the alimentary sac to the surface of the body, where it is subjected to that agent which alone can fit it for the purposes of life.

---

* Lect. Comp. Anat. in the Lancet, 1834, Vol. ii, p. 959.—" All the cilia appear to commence and to cease their motions at the same moment. The constancy with which they continue would seem to exclude the possibility of their being the result of volition; and they are, therefore, more probably determined by some unknown physical cause, dependent, however, on the life of the animal." Roget, Bridgew. Treat. i. 173.

Amongst zoophytes there is no distinction of sexes, but every individual appears to be capable of producing reproductive buds or gemmules.* For the production of these there is, in the opinion of some good observers, a peculiar organ or ovarium in all the ascidian tribes, and it is certain that their gemmules are always generated within the polype cell. There are appropriate productive organs also in the Helianthoida and Asteroida, in the former situated between the ligamentous dissepiments which radiate from the mouth to the base, between the stomach and the skin; and in some of the latter attached to the membranous dissepiments in the abdominal cavity, while in others the gemmules appear to sprout from every part of the abdominal cavity, and of the tube continuous with it. On the contrary, there is no local generative organ in any Hydroida—all are "full of reproductive life:" in the Hydra germs, similar in all respects to the substance of the body, sprout indiscriminately from every part of the surface; in the Tubulariadæ they pullulate from underneath the tentacula where they may frequently be observed in clusters, and, in both of these families, the germs are naked or uncovered. But in the extensive family which embraces the Sertularia and all its subgenera, the gemmules, attached in general to a central placenta, (which is but a continuation of the fleshy central part of the stem,) are enclosed in vesicles of the same texture as the polypidom itself, and neither proceed from, nor have any immediate connection with, the proper body of the polype, being evolutions from the pith or flexy axis which connects the polypes together, and binds the various heads into one whole.—Such is a brief summary of the facts ascertained on this head, but it behoves me to mention that it is, to a certain extent, at variance with the opinions of Professor Grant. He maintains, from his numerous observations on a great variety of zoophytes, that the gemmules by which these animals propagate are highly organized portions of the gelatinous substance of the parent, formed "in almost every known zoophyte," and not merely in the Hydrazoa, as we have limited it, "by the common connecting substance of the animal, and not by the polypi, which appear to be only the mouths or organs of digestion. In Plumulariæ, Sertulariæ, Campanulariæ, horny Cellariæ, Antennulariæ, the ova are formed in vesicles which originate from the centre of the stem. In Flustræ, calcareous Cellariæ, and some others, the ova are formed in the cells, but *exterior to the bodies of the polypi,* which disappear before the ova arrive at maturity. In the Lobulariæ, Gorgoniæ, Spongiæ, Clione, &c. the ova are formed and matured in the *common fleshy substance* of the body before they advance to be discharged through the polypi, or the fecal orifices."[*]

---

* "These corpuscules differ from true ova and seeds, which are ripened by fecundation, inasmuch as the substance of which the new being is formed is not, as ova and seeds are, enclosed in a special envelope, which is separated from them at the moment of the developement of the germ, and inasmuch as the formation of the new individual is owing to the entire substance of the reproductive corpuscule."—Tiedemann's Comp. Phy. 42.

The gemmules exhibit considerable variety in colour,—they are milk-white, yellow, red, pink or green, but sometimes the colour is not fully developed until near maturity. In all the ascidian polypes they are globular or have a tendency to that form, and appear to preserve it until after their discharge from the body; but in the Hydroida this is not the case, for although spherical in their earlier stages, "their shape alters on approaching maturity; it elongates, becomes elliptical, next prismatic, and at length each corpusculum issues as a perfect animal from the orifice of the vesicle," and exhibits in figure and in motion much resemblance to the little leech-like Planariæ. (Fig. 5.[†]) The gemmules are all clothed with vibratile cilia similar to those of the tentacula of the parents. Sometime previous to their discharge from the polypidom they are observed to be in a constant rotatory motion, by which their birth seems to be facilitated; and now at liberty in the water they move and swim about as if they were guided by volition and sense, whirling at the same time on their own axis.[‡] This freedom to move whither they list may continue for several hours, or even for two or three days, before a proper site for their permanent stay and future growth is found, when they begin to shoot up rapidly into those beautiful forms particular to each species, as the Supreme Being has ordered and determined. The transformation of the ova, says Dr Grant,

Fig. 5.

---

[*] Edin. Journ. of Science, No. 14.

[†] The figures represent the gemmules of Plumularia pluma. For the drawing I am indebted to my friend Dr Coldstream of Leith.

[‡] In reference to those of Flustra carbasea—and the observation appears to be very generally applicable—Dr Grant says—"they are very irritable, and are frequently observed to contract the circular margin of their broad extremity, and to stop suddenly in their course when swimming; they swim with a gentle gliding motion, often appear stationary, revolving rapidly round their long axis, with their broad end uppermost, and they bound straight forward, or in circles, without any other apparent object, than to keep themselves afloat till they find them selves in a favourable situation for fixing and assuming the perfect state."—Edin. New Phil. Journ. iii. 117.

"from their moving, irritable, and free condition of animalcules, to that of fixed and almost inert zoophytes, exhibits a new metamorphosis in the animal kingdom, not less remarkable than that of many reptiles from their first aquatic condition, or that of insects from their larva state." One purpose of this mobility in the ova is obvious;—it is a means ordained for their diffusion, for the parents being fixed immoveably to one spot, the reproductive germs would have dropt and sprung up at their roots, had they not, by some such mechanism as we have described, been carried to a distance, and spread over the bosom of the deep.

The evolution of the gemmules, subsequent to their fixation, has been minutely traced by Professor Grant and Mr Dalyell. When the bud falls from the crested head of Tubularia indivisa, slight prominences, enlarged at the tips, pullulate from the under surface, and the "nascent animal" elevating itself on these rudiments of the tentacula, as on so many feet, enjoys the faculty of locomotion. "Apparently selecting a site, it reverses itself to the natural position with the tentacula upwards, and is then rooted permanently by a prominence, which is the incipient stalk, originating from the under part of the head. Gradual elongation of the stalk, afterwards continues to raise the head, and the formation of the zoophyte is perfected."*—So the worm-like embryo of the vesiculiferous Hydroida, a few days after its exclusion from the vesicle, becomes stationary and contracts into a circular or spherical spot which always retains its original colour. It is transparent and soft, but in a short time some opaque fleshy spots are visible within it, and are separated by a thin homogeneous transparent substance, which is to form the future polypidom. "As yet it is exceedingly minute, soft, and gelatinous; but in the progress of its growth, the soft, thin, homogeneous substance of the exterior becomes more dense, embracing the first formed parts of the fleshy substance, indeed all parts, and the whole jelly, with its thin covering, and continues to advance and to radiate. Then we observe a stem beginning to rise from the centre of these radii of roots, which are, in fact, the first formed parts that the little round gemmule shoots out. So that the gemmule is become, not a polypus but a root. It begins then to rise from the centre of the roots, and at length to divide; so it will at length form on its branches a cell, at the bottom of which cell will gradually be developed a polypus."† In the Flustra and other ascidian zoophytes the process is very similar, but in these, instead of the rootlets and little embryo stalk, a cell is the part first formed, in which a polype quickly and almost coetaneously developes itself; and this original cell and polypus is as large, as perfect, as fit for every purpose to which it is destined as any of those which are in rapid succession evolved from its sides and apex, for age adds only to the number of individuals in the polypidom, and nothing to their perfection.

---

* Dalyell, in Edin. New Phil. Journ. xvii. 412.

† Grant, in the Lancet, 1834, Vol. i. p. 229.

ADDITIONAL NOTES.

1. *Raspail's Description of the Structure of Polypes.*

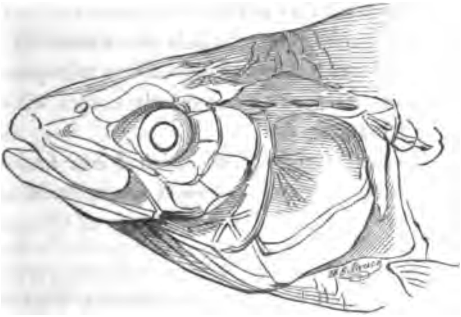
" I have pointed out that the polypus is nothing but the continuation of its case, which becomes bony or cartilaginous in the lower part, in proportion as the upper part is developed. Consequently its tube, or rather its involucrum, instead of being a shapeless transudation from its body, is formed by successive additions of epidermoid membranes applied over each other in proportion as they are successively ossified. I have pointed out also that these polypi are merely microscopic fixed *Cephalopodes*, having, like the large species of this genus, a bag which is contained within the tube, an excrementitial funnel, ovaries, an intestinal canal with similar curvatures, and a head with all its accessories equally corresponding; so that, if the Sepia, for example, instead of having the dorsal part of its large bag ossified, had undergone the same change over the whole external circumference of this organ, and if its base had been fastened by an adhesive substance to a rock, it would have been exactly a gigantic polypus." —New System of Org. Chem. p. 281–2. Obs. The species on which Raspail made these curious observations are not mentioned in the work from which the extract is taken: they seem applicable only to the ascidian polypes.

2. *Dr Grant's Account of the Ova of the Flustræ.*

" Although the ova of Flustræ have been often observed, no one appears to have hitherto examined either their mode of formation within the cells, or their mode of developement after expulsion, so as to determine the real nature of these globular bodies, and the erroneous conjectures of naturalists respecting them have greatly perplexed the history of this genus. The ova of the *F. carbasea* make their first appearance as a small yellow point, a little below the aperture of the cell, and behind the body of the polypus; they are unconnected with the polypus, and appear to be produced by the posterior wall of the cell, in the same manner as the axis, or common connecting substance of the polypi, produces them in other zoophytes. In this rudimentary state, they are found in the same cells with the healthy polypi, but, before they arrive at maturity, the polypi of such cells perish and disappear, leaving the entire cavity for the developement of the ovum. There is never more than one ovum in a cell, and it occupies about a third of the cavity, when full grown and ready to escape. When first visible it has a round or slightly oblong and regular form; when mature, it is ovate with the small end next the aperture of the cell. The ova do not appear in all the cells at one time, nor is there any discernible order as to the particular cells which produce ova, or the part of the branch which contains them. Cells containing ova are found alike on every part of the branches, from the base to within two or three rows from the apex, occupied only by young polypi. Sometimes we find half a dozen or a dozen of contiguous cells all containing ova, sometimes two or three only; and often such cells occur singly, at short and irregular distances from each other. We find the ova in all stages of maturity, on the same branch at the same time; and we seldom observe a specimen of the *F. carbasea,* during the months of February, March, and April, which does not contain numerous ova. The ova have a lively yellow colour; and when they occur abundantly on a specimen or a part of a branch, they cause it to exhibit the same lively hue, which is very different from the dull spotted brown appearance which the branches present at other seasons. Cells are often observed on different parts of the branches, containing neither polypi nor ova; but the fewness of these, and the great number of cells still containing only polypi at the season of generation, render it probable that polypi are regenerated in the empty cells after the escape of the ova. In the empty cells from which the ova have escaped, we frequently observe a few remains of the former polypus, lying at the place where the body of the polypus bifurcated, and where the principal connection seems to exist between the polypus and the axis; we likewise perceive numerous monades and other animalcules busily employed in consuming the remains of the dead polypus. The ovum, even before arriving at maturity, exhibits very obvious signs of irritability, frequently contracting different parts of its surface, and shrinking backward in its cell; the cilia on its surface are likewise observed in rapid motion within the cell, as in the ciliated ova of other zoophytes. The mature ova are often found with their small end projecting from the opening of the cells, and their final escape is aided by the incessant vibrations of the cilia covering their surface, by the ova contracting themselves in their lateral direction, by the waves agitating the branches of the flustra, and by the same incomprehensible laws which regulate the formation and growth of the ova, and the whole economy of this zoophyte."—Edin. New. Phil. Journ. iii. 116–7.

(To be continued.)

III.—*On the Pollan (Coregonus pollan,* Thompson,*) of Lough Neagh.* By WILLIAM THOMPSON, Esq., Vice-President of the Natural History Society of Belfast.



"IN September last a comparison of the Lough Neagh *Coregonus* with the *Vendace* of Lochmaben, (whence I procured specimens through the kindness of Sir William Jardine, Bart.) proved to me that these species are distinct. The disagreement of the former with the *Gwyniad* or *Coregonus* of Wales, as described by Pennant, was at the same time very obvious; and from the examination of an individual of the latter species, (lately favoured me by Mr Yarrell,) and specimens of the Lough Neagh fish, I am fully satisfied that they are specifically different.

" From the Gwyniad, the Pollan or Lough Neagh *Coregonus* differs—in the snout not being produced; in the scales of the lateral line; in having fewer rays in the anal fin, and in its position being rather more distant from the tail; in the dorsal, anal, and caudal fins, being of less dimensions; and in the third ray of the pectoral fin being longest, the first being of the greatest length in the Gwyniad.

" From the Pollan, the Vendace or Lochmaben *Coregonus* differs so essentially in its lower jaw being the longer, as well as in its being turned upwards, as to render further comparison unnecessary.

" The pollan is very uniform in size, its ordinary length being about 10 inches; none that I have ever seen exceeded 12. The relative length of the head to that of the body is as 1 to about 3½; the depth of the body equal to the length of the head; the jaws equal, both occasionally furnished with a few delicate teeth; the tongue with many teeth: the lateral line sloping downwards for a short way from the *operculum,* and thence passing straight to the tail; nine rows of scales from the dorsal fin to the lateral line, and the same number thence to the ventral fin; the row of scales on the back, and that of the lateral line not reckoned: the third ray of the pectoral fin the longest.

D. 2+12. P. 16. V. 1 11. A. 2+11. C. 19. B. 9. *Vertebræ* 59.

"Colour to the lateral line dark blue, thence to the belly silvery; dorsal, anal, and caudal fins towards the extremity tinged with black; pectoral and ventral fins of crystalline transparency, excepting at their extremities, which are faintly dotted with black. Irides silvery, pupil black.

" As not one of the *Coregoni,* of which I can find descriptions, agrees with the Lough Neagh species, I am induced to consider it as new, and venture to propose for it the name of *Coregonus pollan,*[*]

---

[*] Although the pollan accords not with any *Coregonus* yet described, it was with much hesitation that I bestowed on it a new name, being fully aware that the same species is often very differently described by different authors, and under the impression that it may eventually prove identical with some of the continental *Coregoni,* with which I had not the opportunity of comparing it,—the ac-

as by this trivial appellation it is invariably known in its native district."*

The above description of the Pollan was read before the Zoological Society of London on the 9th of June last. The following particulars I then looked forward to publish in a paper on the fishes generally that inhabit Lough Neagh, but, until this can appear, the present contribution towards the history of a species which is certainly distinct from the Gwyniad and Vendace, (the only other *Coregoni* known with certainty as British at the present time) may even, in this incomplete state, possess some interest.

The earliest notice of the species that I have seen is in Harris's history of the county of Down, published in the year 1744, where, as well as in the Statistical surveys of the counties of Armagh and Antrim, it has subsequently been introduced as one of the fishes of Lough Neagh, under the name of Pollan; but, as may be expected in works of this nature, little more than its mere existence is mentioned.†

The habits of this fish do not, with the exception of its having been in some instances taken with the artificial fly, differ in any marked respect from those of the vendace and gwyniad, and are in accordance with such species of continental Europe as are confined to inland waters, and of whose history we have been so fully informed by Bloch. The pollan approaches the shore in large shoals not only during spring and summer, but when the autumn is far advanced. The usual time of fishing for it is in the afternoon, the boats returning the same evening. On the days of the 23d, 24th, and 25th of September 1834, which I spent in visiting the fishing stations at Lough Neagh, it was, along with the common and great lake trout, (*Salmo fario* and *S. ferox*,) caught plentifully in sweep-nets, cast at a very short distance from the shore. About a fortnight before this time, or in the first week of September, the greatest take of the pollan ever recollected occurred at the bar-mouth, where the river Six-mile-water enters the lake. At either three or four draughts of the net, 140 hundreds (123 individuals to the hundred) or 17220 fish were taken; at one draught more were captured than the boat could with safety hold, and they had consequently to be emptied on the neigh-

---

tual examination of specimens being the only true criterion by which to judge of such closely allied species as this genus presents.

* Proceedings of the Zoological Society of London for 1835, p. 77.

† In Harris's "Down," and Coote's "Armagh," it is supposed to be the same as the *shad*. In Dubourdieu's "Antrim," the scientific appellation of *Salmo lavaretus* is given in addition to its provincial name.

bouring pier. They altogether filled five one-horse carts, and were sold on the spot at the rate of 3s. 4d. a hundred, producing L. 23, 6s. 8d. From 3s. 4d. to 4s. a hundred, has been the ordinary price this season at the lake side, or directly from the fishermen; some years ago, it was so low as 1s. 8d. a hundred, but at that time the regular system of carriage to a distance, as now adopted, did not exist. At the former rates, they are purchased by carriers, who convey them for sale to the more populous parts of the neighbouring country, and to the towns within a limited distance of the lake. They are brought in quantities to Belfast, and when the supply is good, the cry of "fresh pollan" prevails even to a greater extent than that of "fresh herring," though both fishes are in season at the same period of the year. In the month of June 1834, 50 hundreds (61500 individuals) of pollans and 125lbs. weight of trout were taken at one draught of a net, at another part of the lake, near Ram's island, which was the most successful capture made there for twenty-four years. In 1834, this fish was more abundant than ever before known. Like the gwyniad and vendace, the pollan dies very soon after being taken from the water,* and likewise keeps for a very short time. It is not in general estimation for the table, but is, I think, a very good and well-flavoured fish.

Though permanently resident, the pollan is very far from being generally diffused throughout Long Neagh, and, unlike the herring, shows but little caprice in the parts of the shore it periodically approaches, rarely appearing in places bordering its chief haunt, and which offer to our view in every respect a similar character. An example of this is afforded by a comparison of the beach, between the river Mayola and Toome, where it rarely occurs, and that from the Six-mile-water to Shane's Castle, its favourite resort. A few houses contiguous to the latter locality were, so long as they existed, dignified with the name of Pollan's Town; but within the last few years, they have been pulled down to make way for "the park's extended bounds."†

In the months of November and December, this fish deposits its spawn where the lake presents a hard or rocky bottom. On the 4th of December 1835, a quantity of the largest pollans I have seen were brought to Belfast market. Several which I obtained for examination were 13 inches in length, and all on dissection proved to be females. Most of them were in full roe, (the ova from 1/10th to ⅛th of an inch in diameter,) but some had partly shed it; one of the former was in total weight 9½ oz. the roe alone weighing 2⅝ oz. In the others, the proportion of roe was similar. On the 11th of the same month, several male specimens of full size that I procured, and which contained milt most prominently developed, measured but 11½ inches. Thus showing, that in maturity the female fish exceeds the male in length, in the proportion of 13 to 11½. Its average weight when in season is about 6 oz. One specimen, mentioned to me as the largest taken within the last ten years, weighed 2½ lbs. The only food that I have, without resorting to the microscope, detected in the stomach of the pollan was a full grown specimen of the bivalve shell *Pisidium pulchellum*. A pebble of equal size was also found along with it. In one which I had the pleasure of sending to Mr Yarrell, he met with a species of *Gammarus*.[*] (Yarr. Brit. Fishes, Vol. ii. p. 88.)

---

* Pennant states this of the gwyniad, and Sir William Jardine of the vendace, (Edin. Journ of Nat. and Geog. Science.) Dr Knox, however, says of the latter species, "that they live as long as most fishes on being removed from the water."—Trans. Roy. Soc. of Edin. Vol. xii. p. 505.

† Shane's Castle Park, the seat of Earl O'Neill.

The *Buddagh*, or great lake trout, is occasionally taken in night lines baited with the Pollan; for which purpose the perch, divested of its spinous dorsal fin, is also used. The lesser black-backed gull (*Larus fuscus*, Linn,) which frequents the lake in considerable numbers, is, in consequence of being believed to subsist on this fish, called there commonly by the name of Pollan Gull.

As yet the Pollan is known to me only as inhabiting Lough Neagh. In Harris's "Down" (p. 238,) it is stated, "that Lough Earn, in the county of Fermanagh, has the same sort of fish, though not in so great plenty." This is probably correct, as Lough Erne is of very considerable extent, ranking amongst the lakes of Ireland as the second in size; being inferior only to Lough Neagh.

IV.—*Descriptions of some new species of Exotic Coleopterous Insects from the Collection of Sir Patrick Walker.* By J. O. WESTWOOD, F. L. S., &c.—Plate VII.

Order—COLEOPTERA.

Section—PENTAMERA, (GEODEPHAGA ADEPHAGA.)

Fam.—CICINDELIDÆ.

DISTIPSIDERA, genus novum.

Corpus elongatum, abdomen capite cum oculis vix latius: *caput*

---

[*] June 10, 1836. On opening the stomachs of six pollans, I found them all filled with food, consisting chiefly of mature individuals of *Gammarus aquaticus*, and the larvæ of various acquatic insects; some shells of the genus *Pisidium*, one of the fry of the three-spined stickleback (Gasterosteus,) and a few fragments of stone also occurred.—W. T.

magnum, subovatum, transverse et irregulariter rugosum: *oculi* magni, valde prominuli: *antennæ* quam caput et thorax vix longiores, graciles, versus apices paulo crassiores, articulo 1mo crasso, subcurvato; 2do minuto; 3tio omnium longissimo, curvato, ad apicem crassiori; reliquis 8vis longitudine fere æqualibus, at sensim paulo crassioribus: *labrum* maximum, mandibulas obtegens, oblongo-ovatum, antice emarginatum, dente parvo in parte centrali emarginato, dentibusque quatuor magnis lateralibus setis paucis elongatis submarginalibus instructum: *mandibulæ* validæ, curvatæ, ad apices acutæ, dentibus duobus internis prope medium armatæ, aliisque duobus basalibus: *maxillæ* elongatæ, intus valde setosæ, apicibus unco mobili armatæ, palpi externi breves, 4-articulati, articulo 1mo brevissimo, 2do crassiori, reliquis duobus gracilibus, ultimo ad apicem paulo crassiori, subtruncato: *palpi interni* gracillimi, 2-articulati: *mentum* brevissimum, transversum, lobis duobus magnis lateralibus, et in medio, dente vix conspicuo armatum: *labium* (seu *ligula*) omnino occultum: *palpi* breves, 4-articulati; articulo 2do brevissimo ultra marginem anticum labrorum lateralium haud protruso; 3tio maximo valde inflato, et lateraliter setis rigidis erectis armato; 4to, 1mo longitudine equante, gracili, lævi: *thorax* capitis (absque labro) longitudine, antice et postice constrictus, medio convexus, lateribus rotundatis: *elytra* oblonga, subparallela, thorace latiora, rugosa, rugis postice transverse coalitis: *pedes* elongati, tarsi antici (in individuo viso) simplices.

This new genus exhibits the characters of several of the groups of Cicindelidæ. From Cicindela it is distinguished by the large size of the labrum, the unarmed mentum, the large labial palpi, the short antennæ, &c. The same characters also remove it from Odontocheila Laporti, of which it has considerably the external habit, but a different thorax. From Therates, which it also much resembles, it is removed by the large labial palpi, simple fourth joint of the tarsi, and by having an internal maxillary palpus. From Dromica its peculiar form and labrum remove it. It appears most nearly allied to Euprosopus and Iresia, agreeing with the former in the structure of the labial palpi, but differing in the labrum and mentum, and resembling Iresia in the form of the body, and in the peculiar style of punctation on the elytra, but having very different palpi.

Sp. 1. DISTIPSIDERA UNDULATA. Fig. 1.

Subcupreo-nigro, labio luteo lateribus nigris, elytrorum humeris et apicibus, fasciis duabus undulatis in medio interruptis, albidis.

Long. corp. lin. 7½.—Habitat in Nova Hollandia?
In Musæo P. Walkeri, Eq.

Nigra, æneo et cupreo perparum tincta : *caput* magnum, impressione verticali in qua linea transverse elevata irregulariter striatum striis gracilibus, cum oculis parallellis, at versus verticem conjunctis, et quasi circulos irregulares efformantibus : *labrum* luteum, lateribus nigris : *antennæ* nigræ, articulis apicalibus brunneis : *mandibulæ* luteæ, dentibus nigris : *maxillæ* fuscæ, dentibus rufis, palpis nigris : *mentum* nigrum, palpis albidis, apicibus articuli 3tii 4tiique nigris : *thorax* cum capite concolor, transverse striatus et punctatus : *elytra* ejusdem coloris, apices versus paulo magis cuprea, magis rude punctata, punctis ultra medium elytrorum in striis transversis, confluentibus, ad humeros macula parva albida, et cum fascia 1ma undulata, et in medio interrupta convexa ; fascia 2da ejusdem coloris, paulo pone medium elytrorum ad latera dilatata, at versus discum tenuior et angulata, at in medio interrupta, denique macula apicalis triangularis ejusdem coloris : *pedes* nigri, trochanteribus apicibusque femorum 4 anticorum et femorum posticorum, basi luteis.

Obs.—The details are lettered alike throughout with the initials of their respective names, *h*, head ; *a*, antennæ ; *m*, mandibles ; *mx*, maxillæ ; *m, p*, maxillary palpus ; *l*, 1, upper lip (labrum ;) *l*, 2, under lip (labium ;) *cl*, clypeus ; *ch*, chin (mentum ;) *l, p*, labial palpi ; *sc*, scutellum ; *t*, tarsus ; *f*. 1. 2. 3. 1st, 2d, or 3d leg ; (*T*.) 1, prosternum. A fixed series of names of this kind would be very serviceable, and far more easy than the kind of references adopted by Savigny.

(MACROSTERNI.) *Fam.*—BUPRESTIDÆ.

BUPRESTIS DECIPIENS. (Fig. 2.)

Læte fulva, opaca, maculâ frontali, lineâ thoracis mediâ, alterisque duabus lineatis lateralibus, elytrorum apice, antennis et pedibus nigro-cæruleis, metasterno et abdomine viridi-cæruleis nitidissimis.

Long. corp. lin. 7½, lat. elytr. lin. 3.—Habitat in Nova Hollandia.
In Musæo Patr. Walkeri, Eq.

Testaceo, fulva-opaca, thorace subnitido : *caput* fulvum, macula parva frontali, alterisque duabus minutis versus basin antennarum apiceque clypei nigris, linea tenui impressa inter oculos, oculis magnis lateralibus, capite ante oculos in rostrum parvum productum : *mandibulæ* parvæ, triangulares, dente parvo acuto terminali, alteroque interno, armatæ : *maxillæ* graciles, bilobatæ, lobis pilosis, interno parvo : *palpis* maxillaribus, lobo externo haud longioribus, 4-articulatis, filiformibus, articulo 1mo minuto vix distinguendo; 2do reliquis longiori, duobus ultimis parvis subæqualibus: *labrum* transverse subquadratum, margine antico ciliato fere recto: *mentum* punctatum, transversum, antice truncatum, lateribus rotundatis, membranâ transversâ antice instructum: *labium* porrectum, membranaceum, ciliatum, palpis labialibus brevibus, filiformibus, articulis 3tiis subæqualibus: *antennæ* cyaneæ,'articulo 2do minori, 3tio et 4to oblongis, 4to obtrigono, reliquis acute et interne productis: *thorax* (seu *pronetum*) transverso-quadratus, antice quam postice paulo augustior, lateribus rotundatis, margineque postico trilobato, testaceus, punctatus, linea longitudinali dorsali, maculisque duobus lunatis, lateribus cyaneo-nigris: *scutellum* parvum, transverse cordatum: *elytra* elongata, parallela, thorace latiora, costata, et pone media paulo dilatata, lobo utrinque in partem thoracis postice inciso porrecto, munito e quo costæ tres producuntur, costis duobus alteris lateralibus; punctatissima et lineis 8 punctorum majorum, costas marginantibus elytrorum, apex fere rotundatus, dente parvo, utrinque versus suturam, et coloris cyanei, qui in suturæ dimidium extenditur: *pedes* graciles, nigro-cyanei, femoribus anticis in medio fulvis, tarsis dilatatis, articulo 4to cordato, et articulum ultimum versus basin ejus emittenti: prothorax subtus fulvus, in medio complanatus, et in metasterno (antice bifido,) postice receptus; mesosternum, metasternum, coxa postice et abdomen viridi cærulea, nitidissima punctata, abdomen 5-articulatum, articulis transversis fere æqualibus, ungues simplices versus basin, subtus paulo angulati.

The appearance of this beautiful species of Bupestris does not at all coincide with that of the family to which it belongs, its opaque costated elytra, rich fulvous colour and pectinated antennæ, giving to it much more the character of an Elater or Lycus.

The characters upon which the recently established genera of this family have been constructed, are in many cases so slight, that I cannot ascertain to which of them the insect in question belongs; indeed, I should rather suppose that it will constitute a distinct form in the family.

The presence of a scutellum places this insect in Solier's second division. From Chalcophora Bupestris and Polycesta it differs in the posteriorly lobed thorax, and hence it must belong to the second subdivision, approaching nearest to Colobogaster, Sphenoptera, and Pæcilonota, but differing from all these in various parts of the mouth.

(APROSTERNI.) *Fam.*—CEBRIONIDÆ.

CLADOTOMA, genus novum.

Corpus ovatum, subsericeum: *caput* parvum, deflexum, sub tho-

racis marginem anticum productum fere absconditum: *oculi* magni, laterales: *antennæ* 11-articulatæ, corporis fere longitudine, inter partem inferiorem oculorum insertæ, articulo 1mo ovali; 2do minuto; 8vis proximis, ramum elongatum, compressum, singulatim emittentibus; 11mo elongato, compresso: *labrum* parvum, transversum, angulis anticis lateralibus rotundatis, lobo minuto, triangulari, membranaceo, in medio instructum: *mandibulæ* validæ, corneæ, acutæ, curvatæ, dente acuto infra apicem internum; extus pilosis: *maxillæ* membranaceæ, lobis duobus instructæ, lobo externo magno, et in quatuor filamenta pilosa et in longitudine decrescentia diviso, lobo interno gracili piloso, setisque decumbentibus, in medio induto: *palpi* maxillares, breves, crassi, 4-articulati, pilosi, articulo 1mo brevi, 2do et 4to ejusdem longitudinis, hoc, elongato-ovato, apice subtruncato: *mentum* brevissimum, coriaceum, labrum in filamentis 4 gracilibus, quorum intermedia longiora et pilosa, divisum; palpi labiales breves, crassi, 4 articulati, articulo 2do brevissimo; 3tio et 4to subæqualibus, hoc elongato, apice subtruncato: *thorax* semicircularis, margine antico deflexo, et supra caput quasi cucullato; angulis posticis subacutis, et ad basin elytrorum arcte applicatis, margineque postico in medio paulo producto: *elytra* oblongo-ovalia, convexa; scutellum parvum, subrotundatum: *prosternum* simplex, inter pedes anticos haud protrusum, pedes breves, graciles, tarsis 5-articulatis, articulo 3tio bilobo, 4to minutissimo versus basin articuli præcedentis insito, 5to elongato, pulvillis nullis.

This is a very interesting genus, which, if we were to admit the tarsal system in an unlimited manner as our guide in the distribution of the Coleoptera, it would be necessary to place in the section Tetramera, with some species of which, as the Galerucidæ, it has indeed considerable analogy. Its chief affinity is however, Atopa, with which it agrees in several particulars, but the structure of the tarsi and antennæ remove it from that genus, and indeed from the little group in which Atopa is placed by M. le Comte de Castelneau in his Memoir upon the Rhipiceridæ, in which he has given the character of antennæ not branched as that of the Atopæ. The structure of the lower jaws and lower lip is very beautiful, and Mr Curtis has represented a somewhat similar structure in Atopa, whilst De Geer has figured the maxillæ of Leptura 4-fasciata, (Mémoires, Vol. v. pl. 4, fig. 13,) which very closely resembles that of Cladotoma, and which De Geer considers serviceable in collecting the honey of flowers.

Sp. 1. CLADOTOMA OVALIS. (Fig. 3.)

Fusca, elytris fulvis, basi et thorace obscurioribus, sutura albida.

Long. corp. lin. 6.—Habitat in Brasilia.
In Musæo P. Walkeri, Eq.

Ovalis, fusca, tenuissime punctato, sericie grisea induta: *caput* cum oculis nigrum, mandibulæ ad apices nigræ, antennæ fuscæ, ramis fulvis: *thorax* fuscus, subnitidus margine antico et postico (in medio) fulvo, scutellum et sutura elytrorum albidis: *elytra* subelevata convexa, lineis nonnullis longitudinalibus, fulva versus basin, obscuriora marginibus lateralibus, sericie alibicantibus: *pedes* fusci, sericii, corpus subtus fuscum griseo-sericeum.

(LAMELLICORNES.) *Fam.*—SCARABÆIDÆ.

HYBOMA CARINATA. Fig. 4.

Nigra, obscura, thorace in medio valde elevato bicarinato, elytris in mediis et versus apices tuberculis acutis curvatis instructis.

Long. corp. Lin. 7.—Habitat. in America Meridionali.
In Musæo Patr. Walkeri, Eq.

Nigra subopaca, sub lente fortissimo punctis circularibus undique notata: *caput* magnum, planum, deflexum antice, lobo parvo centrali bifido armatum, et ad latera ante oculos utrinque incisum: *oculi* lunati, (seu potius margine laterali capitis antice intranti:) *antennæ* fuscæ, 9-articulatæ: *thorax* magnus, ad latera angulatus, dorsoque valde elevato et bicarnato, carinis postice connexis, scutellum obsoletum: *elytra* planiuscula subquadrata, pone medium paulo dilatata, disco subundulato, carina elevata, acuta, humerali, tuberculisque duobus centralibus, curvatis et acutis in singulo, alterisque quatuor in singulo versus apicem formæ ejusdem, margo lateralis inflexus: *pygidium* nudum deflexum: *pedes* graciles, intermedii ad basin valde remoti, tibiæ anticæ marginibus externis serratis, et ad apicem 3-dentatæ, tarsi antici, minutissimi sed distinctè 5-articulati, tibiæ intermediæ 2-calcaratæ, postice longiores curvati, 1-calcaratæ simplices, tarsis ad apicem tibiarum insertis.

Fam.—GEOTRUPIDÆ.

GEOTRUPES LETHROIDES. (Fig. 5.)

G. niger, latissimus, capitis cornu erecto, thorace impressione magno antico, posticè elevato, elytris semiglobosis.

Long. corp. lin, 9½, lat. lin. 6.—Habitat in America Meridionali.
In Musæo Patr. Walkeri, Eq.

Niger, subopacus, et sub lente forti tuberculis minutissimis undique obtectus: *caput* transversum, clypei margine antico rotundato, in medio cornu brevi erecto armatum: *labrum* transversum, membranaceo-marginatum, setosum, mandibulæ oblongæ, extus obtuse

cornuto, et ad apicem dentibus duobus acutis, alteroque infero truncato, armatæ, intus ciliatæ: *maxillæ* et organa labialia ut in Geotrupidibus typicalibus: *antennæ* longiores, 11-articulatæ, articulis 2, 3, 4, subæqualibus: *thorax* magnus, transversus, lateraliter et postice elevatus, depressione magna subrotundata, partem anticam thoracis occupanti, in qua ad marginem anticum, tuberculum parvum longitudinale exstat; margo ipsius partis depressus ad latera, subacutus, postice vero depressus; angulis posticis thoracis productis subacutis: *elytra* semiglobosa, valde convexa, nec striata nec oculo nudo punctata, tenue marginata: *pedes* robusti, tibiis anticis 6-dentata.

The remarkable outline of this insect, with its dentate mandible, subelongated antennæ, carinated head, singularly depressed thorax, and smooth gibbous elytra, seem to be characters of higher value than those indicating a species. I have not, however, ventured to separate it generically from Geotrupes, but have figured the essential organs for comparison. G. latus of Leach, figured by Sturm in his Catalogue, and said by Dejean to be from Barbary, seems to be allied to this species, but wants the remarkable characters exhibited by the head and thorax of G. lethroides.

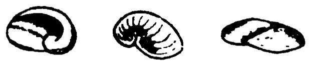
V.—*On the Comparative Elevation of Testacea in the Alps.* By EDWARD FORBES.

THE influence of elevation on the distribution of plants is at present a popular theme with the botanist, whilst the same influence on that of animals is comparatively neglected, though (among the invertebral tribes particularly) many important results may be expected from researches on that subject. The following data, though few, may yet have their use in showing how far such an influence affects the species of shell-bearing mollusca. The stations at which the observations were made are the Pass of the Gemmi, and the mountain of Faulhorn in the Swiss Alps, during the month of July 1835. The highest part of the Gemmi is that beside the Dauben-see, marked by Keller at 6360 feet. The summit of the Faulhorn is 8200 feet above the sea-level. In the absence of accurate measurements, I have marked the distribution by the characteristic plants of the elevations at which the species were found.

I. The highest Testacea occurred at the edges of glacial masses by the Dauben-see, and on the Faulhorn at about 7000 feet. Vegetation that of "the Glacial Zone:" Soldanella alpina and minima, &c.

VITRINA, nov. sp. *V. glacialis*, Mihi.

Testa hyalina, supra plana, *spiris* duobus ; *apertura* patentissima, ovato-oblonga. Long. ⅓ poll. Lat. ⅛. *Animal* nigrum ; *capite, caudâ, tentaculisque* obtusis.



I found this beautiful and very distinct species of Vitrina in considerable plenty under stones on the high elevations referred to, and only there. Ferrussac figures two alpine species, the V. annulata, "Venetz," and the V. pyrenaica, both of which appear to be varieties of V. pellucida, and far removed from the V. glacialis, the nearest ally of which is perhaps the V. elongata of Draparnaud: but the animal of V. elongata is grayish-white, a distinction sufficiently specific, independent of the comparative characters of the shells. The V. glacialis seems to have escaped the observation of the Swiss conchologists Thomas and Studer, neither of whom refer to any other species in their catalogues, besides V. pellucida and V. elongata. Few indeed would think of searching for shells in such an icy habitat as that of the V. glacialis.

Helix arbustorum, var. alpina, Ferr.

This dwarf variety is found abundantly at about the same elevation with the Vitrina, and ceases in the following zone.

II. At Swaribach on the Gemmi and similar elevations, never very close to the snow masses. Plants—Nigritella angustifolia, Polygala chamaebuxus, &c.

Bulimus (Cionella) *lubrica*, var. alpina.

A very pretty and curious variety of this species, distinguished from the normal form by its dwarf size, more contracted mouth, and whitish colour.

Pupa secale, Drap.
—— cylindrica, Ferr.
—— marginata, Drap.

Clausilia with the shell tapering, almost smooth : mouth with a single primary tooth and an obsolete secondary fold. Var. of C. minima, Pfeiffer ?

Helix rupestris, Drap.
—— crystallina, Drap.
—— trochilus, Mont. (fulva, Mull.)
—— nitida, Mull.

In springs on the Faulhorn at the same elevation I found Lymnæa fossaria, β. minuta, Drap. an Cyclas (Pisidium) obtusale, Pfeiff?

III. The dwarf pines appear. All the species mentioned under II. are found in this and the following zone, with the exception of the alpine form of Bulimus lubricus and the Clausilia above-mentioned.

Helix hispida, β, (an Helix concinna, Ferr ?)
—— rotundata, Mull. (radiata, Mont.)

IV. The following species were plentiful in the first pine forests :

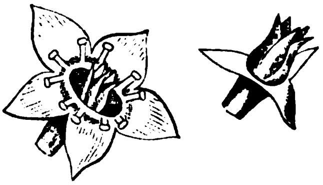
Helix villosa, Drap.
—— pomatia, Lin.
—— personata, Drap.
—— obvoluta, Mull.
Clausilia bidens, Dr.
——— rugosa, Dr.
——— perversa, Pfeiff.
——— solida, Drap.
Bulimus montanus, Drap.
——— (cionella) lubrica, Mull.

In the lowlands of Berne the Testacea are those of the north of Europe and Germany, but in the Vallais the conchology assumes a more southern character. The trunks of the chestnut trees about Sion are often covered with the Helix sylvatica, Drap. and under stones we find Bulimus radiatus, Pupa quadridentata, and Pomatias maculata.

VI.—*On the Structure of the Flowers of Adoxa moschatellina.* By the Rev. J. S. Henslow, M. A. Professor of Botany in the University of Cambridge.

The flower of Adoxa moschatellina, as is well known, are arranged in a head, and are so placed that one is terminal, and four others lateral. They are composed of four whorls; but the number of the parts in each is usually different in the terminal and in the lateral flowers. In speaking of the subordinate parts of the two outer whorls we shall consider them as sepals and petals, which cohere to form a gamosepalous calyx and gamopetalous corolla. In this sense then, the terminal flower more usually contains 2 sepals, 4 petals, 8 stamens, and a 4-celled ovarium, which may be considered as compounded of 4 carpels, while the lateral flowers contain 3 sepals, 5 petals, 10 stamens, and 5 carpels (*Fig.* 1.) Such is the ordinary view taken of the structure of these flowers. They are, however, very subject to vary in the number of their parts, and we propose to examine each whorl in detail.

Fig. 1.



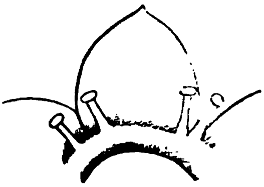
1. *The calyx.* This whorl varies both in the terminal and lateral flowers, with 2, 3, or 4 sepals. In the latter case 3 of the sepals were observed to alternate with 4 petals, and the fourth sepal to be opposite a fifth petal.

De Candolle does not consider this whorl as a true calyx, but calls the corolla a calyx. This reduces the sepals to bracteæ, and as these are combined, the whorl must be considered as an involucrum. In this case we have the tube of the involucrum combining with the lower half of the ovarium, and also uniting with the calyx and stamens. There seems to be no sufficient reason for admitting such an anomaly, and the view usually taken appears to be preferable.

2. *The Corolla.* This is always composed of either 4 or 5 petals, which cohere by their bases and to the upper edge of the calyx, where it becomes free from the ovarium. Some of the petals are sometimes opposite and sometimes alternate with the sepals, which they exceed in number by 1, 2, or 3 parts.

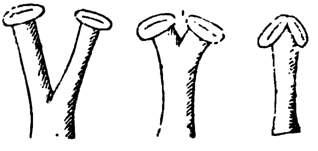
3. *The Stamens.* These are placed very evidently in pairs, a single stamen of each pair standing on either side of the sinus formed by the union of two contiguous petals. De Candolle asserts that half are opposite, and half alternate, with the petals. This view must be ascribed to a desire to obviate the apparent anomaly of their being neither opposite nor strictly alternate with the petals, but it is decidedly inadmissible. He has not observed that the anthers consist of a single lobe, nor can I discover that this fact has been previously noticed by any author except Dr Hooker, who in his Flora Scotica has the following remark: "Stamens united in pairs, or they may be considered as 4 or 5 forked stamens, each ramification terminated by a single cell of an anther, and all springing from a fleshy ring that surrounds the germen."

Fig. 2.



I was ignorant of this observation, but was led to make the same remark last spring, by reflecting in what way it would be possible to reduce the anomalous structure of this flower to some normal condition, in which the parts of the several whorls would be arranged agreeably to the generally established rules of morphology. De Candolle's view appeared to be quite untenable. Upon examining a great number of specimens, I observed in many instances a very decided tendency

Fig. 3.



in the filaments to combine in pairs. Following up the hint which was thus afforded, I found that the anthers were composed of a single cell; and that it was in those cases only where two contiguous filaments had become completely united, that we ever have a perfect stamen crowned by a two-lobed anther. This at once solved the difficulty, and reduced the structure of the flower within the usual conditions. Dr Hooker has not decided which structure should be adopted, and has followed the arrangement generally adopted of classing this plant under Octandria. The fact of the frequent coherence of the filaments in the contiguous stamens, combined with the regularity thus introduced into the arrangement of the several parts of the contiguous whorls, singularly strengthens the conjecture he had hazarded from the consideration of the anthers being one-celled, and may indeed be considered as affording as direct a proof of the normal condition of this flower as the subject will admit. It may therefore be stated as containing 4 whorls of 5 parts each, the parts alternating in the successive whorls,—a structure eminently characteristic of a dicotyledonous plant, and probably exhibited in greater perfection in the genus Crassula than in any other. In the present case, the deviation from the normal character in the lateral flowers consists in the ordinary suppression of 2 or 3 parts in the calyx, sometimes of 1 only; and in the terminal flower in the suppression of one part in all the whorls as they are usually exhibited in the lateral flowers.

Among the numerous specimens which I examined, some had the stamens partially converted to leaves; two small ones being placed facing each other and occupying their usual position on the corolla. (Fig. 4.) In some cases a supernumerary petal of small dimensions was accompanied by a thick filament bearing a three-lobed anther, a monstrosity which apparently originated in a complete and supernumerary stamen having been also developed, and united with the half stamen to which it was contiguous. In other cases, the contiguous filaments were united, and one part foliaceous, the other antheriferous, recalling the structure of the stamens in a Canna.

Fig. 4

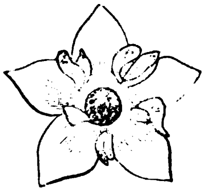


Fig. 5.

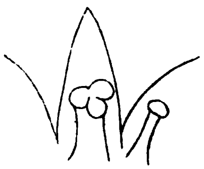


Fig. 6.

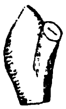
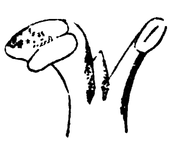


Fig. 7.



REVIEWS AND CRITICAL ANALYSIS.

I.—*Flora Hibernica, comprising the Flowering Plants, Ferns, Characeæ, Musci, Hepaticæ, Lichenes, and Algæ of Ireland, arranged according to the Natural System, with a Synopsis of the Genera according to the Linnæan System.* By James Townsend Mackay, M. R. I. A. &c. 8vo. Dublin, 1836.

An Irish Flora has been long felt to be a desideratum. While Great Britain was glutted, as it were, with descriptions of its vegetable productions, no attempt was made even to enumerate the plants of Ireland, until 1824, when the worthy author of the present volume gave to the Royal Irish Academy, his Catalogue of the Phænogamous Plants and Ferns which he had then ascertained to be natives of the country. This catalogue was, he informs us, the result of twenty years observation, and in the preface he announced his intention of extending it into a complete Flora. Such a work has been therefore looked for at his hands, and although it is somewhat of the latest in its appearance, we receive it with a cordial welcome. It seems from a paragraph in the introduction that, "in 1833, a small volume appeared entitled the *Irish Flora,* containing short descriptions of most of the Phænogamous Plants and Ferns of Ireland that were known up to that time." This work we have never seen.

The Flora Hibernica is arranged according to the Natural System, and is divided into three parts; the first containing the flowering plants and ferns; the second, the *Musci, Hepaticæ,* and *Lichenes*; and the third, the *Algæ*. In regard to the first part, (which is preceded by a synopsis of the genera according to the Linnæan method,) the best idea we can give of the manner in which it is executed is to say that, with the exception of the arrangement, the whole is constructed on the model of the *British Flora.* We must not be understood as bringing any charge of plagiarism against Mr Mackay, for he candidly informs the reader that his descriptions both of genera and species, are generally adopted from the *British Flora*, as well as the etymologies of the generic names. We are convinced that the work has not lost any practical value in so excellent a guide having been followed as Sir W. J. Hooker; but at the same time, our friend Mr Mackay will allow us to express a regret that, in the first respectable Flora of such a country as Ireland, a little originality should not have been exhibited. We are sorry also not to see a few observations upon the geographical distribution of Irish plants, as compared with England and Scotland; but this most interesting subject will probably increase the value of a second edition at no distant period. *

The plan adopted by the author, of treading for the most part in the steps of Hooker, leaves little scope for critical remarks. He has naturally enough followed the example offered by the Floras of England and Scotland, of admitting various doubtful plants into his list; but there are two which we consider as more than usually questionable; viz. *Dianthus plumarius*, and *Lythrum virgatum*. A more interesting plant is a curious heath, named by Mr Babington *Erica Mackaiana.* We wish it may be truly distinct, but it is very nearly allied to *E. tetralix,* which it resembles in its flowers and awned anthers, while in its leaves it approaches *E. ciliaris.** It is found in Cunnamara, the country of *E. Mediterranea,* and *Menziesia polyfolia. Saxifraga geum, δ.* of Hooker is raised to the rank of a species, under the name of *S. elegans;* the author states that it has retained its distinctive characters in cultivation since 1807. The Irish whin, *Ulex strictus* of the catalogue of Irish plants, is reduced to a variety of *U. Europæus;* but we confess we are as much in doubt respecting that peculiar-looking plant, as Sir W. J. Hooker, who admits that he is at a loss whether to refer it to *U. Europæus,* or *nanus,* or to consider it as a species. But surely the same scruple need not exist in regard to the Florencecourt yew, the *Taxus fastigiata* of Lindley's Synopsis. Individuals exist in Ireland of fifty years growth. In some few instances Mr Mackay differs from Sir W. J. Hooker; for example, the genus *Conopodium* of Koch is preferred to *Bunium* for the common earth-nut; and *Helosciadium* of Koch adopted by Hooker for *Sium nodiflorum, repens* and *innudatum* is rejected. *Calamintha officinalis* is also still included in the genus *Thymus.* He has fallen into the same error as Sir W. J. Hooker in describing *Habenaria chlorantha* both under that name, and also under the denomination of *H. bifolia,* but there is reason to believe that Mr Mackay had not seen the true *H. bifolia* of Linnæus, which is probably not a native of Ireland. The three common *Primulæ* are kept up with an observation that many botanists consider them as only varieties. There seems to be a delicate forbearance exercised by almost all writers of floras towards the "pale primrose," the "freckled cowslip," and their supposed hybrid the oxlip. Linnæus believed them to be the children of one parent. Professor Henslow brought the question to the test of direct experiment, and raised them all from the same root. Hooker observes, "They are rarely found intermixed, and in Scotland the two last kinds (*P. elatior* and *veris*) are scarcely known.† Mr H. F. Talbot found upon the summit of a high mountain near the lake of Thun, in Switzerland, *P. elatior* in abundance, while *P. veris* was confined to the base of the hill, and *P. vulgaris* was not found within fifty miles of it." This is a highly curious fact; but supposing the plants to be varieties, it only proves their characters to be singularly constant. If it is an ascertained fact that they are really varieties, they ought to be acknowledged as such, and a scientific truth recognized. It is very remarkable that *Primula farinosa* has not been found in Ireland.*

---

* In addition to remarks on the geographical distribution of plants hinted at by our contributor of the above article, we should like to see embodied in a new edition, which we sincerely trust is already called for, a little more distinction, marked either by type or otherwise, between the plants which are really indigenous and those of spurious rank; the localities more decidedly pointed out, and the places of growth stated with more precision, and "with a steady eye to their mineralogical characters,"—and surely it is indispensable to have the provincial names noted in the native Irish. Ireland has ever been to us a favourite country, and we have looked upon it as affording peculiarities remarkably enticing to the faunist or florist. It is of sufficient extent to be itself a province, has variety of hill and dale, of wide-spreading lakes and noble rivers, of waste and woodland, of sea-coast and of alpine ranges. It is separated from its sister isle, (from which the annexed table will show it to vary curiously in its botanical productions,) only by a narrow strait, from the continent of Europe by a wider space, while on another side it is open, and exposed to the storms and surge of the ocean. It would be curious to trace the influence of the nearest lands on its animal productions, and on its flora. The vegetation of the west coast might be contrasted with that of the east and north. The influence which the greater moisture and less severity of her winters had on the habits and physiognomy of the vegetation, or in clothing her hills with mossy and saxifragous plants, might be carefully marked and compared. This, we know, would be a task difficult and tedious, though to some delightful; but the Florist of Ireland, independent of his scientific acquirements, must catch the spirit of the clime; he must learn to love the green isle and its every beauty; he must add some tincture of the poet and a love for the olden time, a taint of the learning and eccentricity of the antiquary;—before commencing he must invoke the manes of Linnæus and of Wahlenberg.

---

* See Mr Babington's characters at page 201.

† This is a mistake as far as regards *P. veris,* which is by no means unfrequent. We have seen whole fields as thickly dotted with cowslips in Scotland as in England.

The second part of the volume is from the pen of Dr Taylor, the able coadjutor of Professor Hooker in the well-known *Muscologia Britannica*. The acute observer is manifest in every page, but especially in the descriptions of the *Hepaticæ*, which evidently exhibit the result of a long series of observations upon the living plants. A new genus (*Hygrophila*) is established to receive the *Marchantia irrigua* of Wilson † (in Brit. Fl.) and we have two new species of *Jungermannia;* one hitherto confounded with *J. epiphylla;* the other parasitic upon *Hypnum loreum*, and so minute as to be only visible under the microscope. Among the *Musci* we have a recent acquisition (*Gynostomum tortile*, Schw.) a near species of *Glyphomitrion*, and a new species of Bridel's genus *Zygotrichia*. Ireland seems to be exceedingly rich in lichens. Besides a host of species already known as inhabiting the British islands, Dr Taylor has described forty-three new species belonging to various genera, eleven known species introduced for the first time into our Flora, besides a new genus called *Syncesia*, constructed to receive a rather obscure plant allied to *Arthonia*.* Dr Taylor has performed his share in the Flora Hibernica admirably; and we are only disposed to complain of his having adhered too rigidly to the genera of Acharius after they have been, by universal consent, more or less modified.

---

* There is one other point well worthy of attention,—and yet but slightly noticed in this work,—we mean the *bog-timber* of Ireland, more particularly the pine tribe. Mr Mackay appears to have satisfied himself that not more than one species of pine is found in the bogs, and that that is identical with the *Pinus sylvestris*, for he says under that head, (p. 259) "this tree appears to have been abundant in Ireland, as trunks of very large dimensions are often found in the bogs," and expresses no doubt of their identity with the Scotch fir. Any person reading this observation would suppose that the point was settled, yet, indeed, there still remains great doubts on the subject, for apparently at least two different kinds of deal exist in the bogs. One has a stem spirally twisted in a very marked manner, is very inflammable, gives out a fine perfume when burned, and is used in the place of candles and torches by the peasantry in many parts of the island. One of them also, we believe the latter, has the root far larger in proportion to the timber, than it is found to be in the Scotch fir. It is more than a speculative point to determine the species, for since a fir once grew to a very large size in the wetter of the Irish bogs, it might do so again could we succeed in obtaining the same species of tree; and there is no way to come to the desired information, excepting by a careful and microscopical examination of the structure of every kind of bog-timber.

† *Ord.* HEPATICÆ. *Genus* HYGROPHILA.—*Male receptacle* pedunculated, hirsute, with short scattered hairs. *Female receptacle* pedunculated, hirsute, with short scattered hairs. *Calyx* none. *Loculi* univalved, carnose, opening at the top with a vertical short fissure. (Frond without pores.)

The last division of the work, devoted exclusively to the *Algæ*, has been contributed by Mr Harvey, whose intimate acquaintance with the order is sufficiently shown in Hooker's British Flora. It is a department as full of interest, as the objects themselves are often graceful and beautiful. Mr Harvey has done his part well and carefully. The *Algæ Britannicæ* of Dr Greville has to a considerable extent served him as a guide, and he has adopted verbatim, with due acknowledgement, that author's description of the *Diatomaceæ*, as contributed to the British Flora. But Mr Harvey is no copier,—he plainly investigates and thinks for himself; and his portion of the Flora Hibernica contains much valuable information. All the Irish Algæ he has arranged into three grand divisions, which, from the colour of the seeds, he denominates MELANOSPERMEÆ, RHODOSPERMEÆ, and CHLOROSPERMEÆ. In the first division we find the tribe *Ectocarpeæ* placed between *Dictyoteæ* and *Chordarieæ*; and in the second division, *Gloiocladeæ*, the first tribe, containing the genera *Mesogloia*, *Gloiosiphonia* and *Chætospora*, precedes the *Gastrocarpeæ*. Such an arrangement exhibits new and ingenious views respecting the affinities of *Ectospermeæ* and *Gloiocladeæ*.

In order to add some degree of interest to this article, we have drawn up a table, which exhibits at one view the relative Floras of England, Scotland, and Ireland, in regard to the total number of genera and species in each natural order; as well as a list of those British genera in which the Irish Flora is deficient.

---

* *Ord.* LICHENES. *Genus* SYNCESIA.—*Thallus* crustaceous. *Apothecia* oblongo-elongate, stellato-radiata, aggregated and immersed in scattered thallodal *verrucæ*. *Perithecium* none. *Lamina prolifera* pellucid, supported on opaque vertical layers.

	England.		*Scotland.*		*Ireland.*		*British Genera not represented in the Irish Flora.*
ORDERS.	*Gen.*	*Sp.*	*Gen.*	*Sp*	*Gen.*	*Sp.*	
1. Ranunculaceæ,	13	33	10	26	8	24	Actæa, Aconitum, Adonis, Pæonia, Delphinium, Myosurus.
2. Berberideæ	2	2	2	2	1	1	Epimedium.
3. Nymphæaceæ,	2	3	2	3	2	2	
4. Papaveraceæ,	4	10	4	6	4	8	
5. Fumariaceæ,	2	6	2	4	2	4	
6. Cruciferæ,	30	69	26	62	23	49	Teesdalia, Turritis, Iberis, Hutchinsia, Dentaria, Vella, Koniga.
7. Resedaceæ,	1	3	1	2	1	3	
8. Cistineæ,	1	5	1	1	1	1	
9. Violarieæ,	1	8	1	8	1	8	
10. Droseraceæ,	1	3	1	3	1	3	
11. Polygaleæ,	1	1	1	1	1	1	
12. Frankeniaceæ,	1	2					Frankenia.
13. Elatineæ,	1	2	1	1	1	1	
14. Caryophylleæ,	12	50	12	49	10	36	Buffonia, Cherleria, Holosteum, Moenchia.
15. Lineæ,	2	4	2	2	2	5	
16. Malvaceæ,	3	6	3	5	3	5	
17. Tiliaciæ,	1	3	1	2	1	2	
18. Hypericineæ,	2	10	2	12	2	10	
19. Acerineæ,	1	2	1	2	1	2	
20. Geraniaceæ,	2	16	2	15	2	13	
21. Balsamineæ,	1	1	1	1			Impatiens.
22. Oxalideæ,	1	2	1	2	1	1	
23. Celastrineæ,	2	2	1	1	1	1	Staphylea.
24. Rhamneæ,	1	2	1	2	1	2	
25. Leguminosæ,	17	65	17	48	16	41	Hippocrepis, Onobrychis, Oxytropis.
26. Rosaceæ,	11	50	10	43	10	41	Sibbaldia.
27. Pomaceæ,	4	10	2	5	2	5	Mespilus.
28. Amygdaleæ,	1	5	1	5	1	5	
29. Sanguisorbeæ,	3	5	3	6	2	4	Sanguisorba.
30. Onagrariæ,	4	12	2	11	2	8	Isnardia, Œnothera.
31. Halorageæ,	3	6	3	4	3	5	
32. Ceratophylleæ,	1	2	1	1	1	2	
33. Lythrariæ,	2	3	2	2	2	4	
34. Tamariscineæ,	1	1					Tamarix.
35. Cucurbitaceæ,	1	1	1	1			Bryonia.
36. Portulaceæ,	1	1	1	1	1	1	
37. Paronychieæ,	5	7	1	2	1	1	Corrigiola, Herniaria, Illecebrum, Polycarpon.
38. Crassulaceæ,	5	16	4	10	4	10	Tillæa.
39. Grossularieæ,	1	6	1	5	1	3	
40. Saxifrageæ,	2	13	2	17	2	16	
41. Umbelliferæ,	40	62	30	47	30	44	Æthusa, Coriandrum, Meum, Seseli, Tordylium, Petroselinum, Physospermum, Sison.
42. Araliaceæ,	2	2	2	2	2	2	
43. Corneæ,	1	2	1	2	1	1	

ORDERS.	*England.*		*Scotland.*		*Ireland.*		*British Genera not represented in the Irish Flora.*
	Gen.	*Sp.*	*Gen.*	*Sp.*	*Gen.*	*Sp.*	
44. Loranthеæ,	1	1	1	1			Viscum.
45. Caprifoliaceæ,	4	8	4	7	3	4	Linnæa.
46. Stellatæ,	4	18	3	16	4	13	
47. Valerianeæ,	2	7	2	5	2	4	
48. Dipsaceæ,	3	6	3	5	3	3	
49. Compositæ,	48	122	43	106	40	87	Borkhausia, Chrysocoma, Cineraria, Conyza, Diotis, Doronicum, Lactuca, Echinophora, Onopordum, Serratula
50. Campanulaceæ,	2	11	1	7	1	4	Phyteuma.
51. Lobeliaceæ,	2	3	2	2	2	2	
52. Vaccinieæ,	1	4	1	4	1	3	
53. Ericeæ,	4	7	6	9	5	9	Azalea.
54. Monotropeæ,	2	4	2	5	2	5	
55. Ilicineæ,	1	1	1	1	1	1	
56. Oleineæ,	2	2	2	2	2	2	
57. Apocyneæ,	1	2	1	2	1	2	
58. Gentianeæ,	7	14	3	8	6	11	Swertia.
59. Polemoniaceæ,	1	1	1	1	1	1	
60. Convolvulaceæ,	2	5	2	5	2	4	
61. Borragineæ,	10	23	10	21	8	15	Asperugo, Pulmonaria.
62. Solaneæ,	5	12	4	8	5	7	
63. Orobancheæ,	2	7	2	3	2	4	
64. Scrophularineæ,	12	42	11	35	11	32	Limosella.
65. Labiatæ,	23	54	21	42	20	42	Acinos, Melittis
66. Verbenaceæ,	1	1	1	1	1	1	
67. Lentibulariæ,	2	5	2	6	2	6	
68. Primulaceæ,	9	17	7	15	7	13	Cyclamen, Trientalis.
69. Plumbagineæ,	1	5	1	3	1	3	
70. Plantagineæ,	2	6	2	6	2	6	
71. Amaranthaceæ,	1	1					Amaranthus.
72. Chenopodeæ,	5	23	5	18	5	19	
73. Polygoneæ,	3	23	3	21	3	20	
74. Eleagneæ,	1	1	1	1			Hippophae.
75. Thymeleæ,	1	1	1	1			Daphne.
76. Santalaceæ,	1	1					Thesium.
77. Aristolochieæ,	2	2	1	1			Aristolochia, Asarum.
78. Empetreæ,	1	1	1	1	1	1	
79. Euphorbiaceæ,	3	16	2	9	2	9	Buxus.
80. Urticeæ,	3	5	3	4	3	5	
81. Ulmaceæ,	1	7	1	4	1	4	
82. Betulineæ,	2	2	2	3	2	2	
83. Salicineæ,	2	50	2	65	2	35	
84. Corylaceæ,	5	6	5	6	5	6	Castanea.
85. Myriceæ,	1	1	1	1	1	1	
86. Coniferæ,	2	2	3	3	3	3	
87. Alismaceæ,	3	5	1	3	2	4	Actinocarpus.
88. Butomeæ,	1	1	1	1	1	1	
89. Juncagineæ,	2	3	2	3	1	2	Scheuchzeria.
90. Aroideæ,	1	1	1	1	1	1	
91. Acoraceæ,	1	1	1	1			Acorus.
92. Typhaceæ,	2	6	2	5	2	5	
93. Pistiaceæ,	1	4	1	4	1	4	
94. Fluviales,	4	18	4	16	4	15	

	Orders.	*England.*		*Scotland.*		*Ireland.*		*British Genera not represented in the Irish Flora.*
		Gen.	*Sp.*	*Gen.*	*Sp.*	*Gen.*	*Sp.*	
95.	Smilaceæ,	3	5	3	5	2	2	Ruscus.
96.	Liliaceæ,	2	2	1	1			Tulipa.
97.	Asphodeleæ,	8	18	6	11	3	6	Anthericum, Asparagus, Gagea, Muscari, Ornithogalum.
98.	Melanthaceæ,	2	2	2	2	1	1	Tofieldia.
99.	Eriocauloneæ,			1	1	1	1	
100.	Junceæ,	3	22	3	25	3	16	
101.	Hydrocharideæ,	2	2	2	2	2	2	
102.	Orchideæ,	12	35	8	19	8	22	Aceras, Corallorhiza, Cypripedium, Goodyrea, Herminum, Liparis
103.	Irideæ,	3	9	1	1	2	3	Trichonema.
104.	Amaryllideæ,	3	5	2	2	2	4	Leucojum.
105.	Dioscoreæ,	1	1					Tamus.
106.	Gramineæ,	40	113	32	96	30	80	Cynodon, Gastridium, Hierochloe, Knappia, Panicum, Setaria, Spartina, Stipa, Lagurus, Polypogon.
107.	Cyperaceæ,	10	78	9	81	8	66	Cyperus, Elyna.

II.—*Voyage aux Indes Orientales, par le nord de l'Europe, pendant les années* 1825–26–27–28 and 29. ZOOLOGIE, par MM. C. BELANGER, ISIDORE GEOFFROY SAINT HILAIRE, LESSON, VALENCIENNES, DESHAYES, et GUERIN. 8vo. Avec atlas grand in 4to. Paris, Arthur Bertrand, 1834.

THOUGH thè above noted volumes commenced their appearance more than two years since, we have thought them sufficiently important, and sufficiently little known to the British Zoologist, to merit a short notice under our section of "Reviews and Analysis;" while the botanical portion, having lately commenced, the entire work may be said to be only approaching its completion.

M. C. Belanger was one of those enthusiastic naturalists whom the superintendents of the continental museums have employed with so much success; and we cannot help expressing our regret that something similar is not attempted by the institutions of this country, assisted by our government. Young men possessed of an ardent love of nature are selected, they are brought to the capital, and receive instructions, and study under the first professors. The desiderata in every branch are pointed out, the facts and species which require elucidation, species which have not been sufficiently made out, physiological investigations which can only be noted on the spot which the animal inhabits, and a long list of queries to be solved, in all the departments, are given to them before they are dispatched on their various expeditions; and if they do not always possess the experience of matured study, they are at the season of life when their zeal is ardent, and their activity and enthusiasm are unbounded. It is in this manner that the collections on the continent so long surpassed in the number of species those of this country; and the expense of maintaining those travelling naturalists is in reality not greater, than that arising from the large prices occasionally paid for some privately procured collection, or for some rare specimen. Returning from the expedition, the results are placed in the hands of gentlemen versed by long experience in the branches they undertake, and, as in the present instance, they often appear as a series of essays by the individuals to whom they had been entrusted.

Belanger left Paris in 1825. He crossed Germany, Poland, Southern Prussia, Georgia, and the Persian Provinces under the Russian dominion, and penetrating into Persia, he embarked for Bombay, and finally arrived at Pondicherry in the commencement of 1836. Persia he crossed from Erivan to Bouchir, running over the most interesting parts, but travelling with a caravan, and being dependent on the season for crossing the Caucasian chain, the time spent in this country was comparatively lost. At Bombay he suffered under ill health brought on by the climate and exertion, but visited the Isle of Elephanta and the coast of Malabar, and made some additions to his collections; but it was not till some time after his arrival at Pondicherry, which he made head-quarters, that the most profitable part of his expedition might be said really to commence. From hence he made extensive excursions, and for a time removed to Bengal, where he explored the riches of the Ganges.—Again penetrating by the river Irawaddi, already known as the scene of the botanical labours of Wallich, he visited Pegu, endeavouring to collect in his way the productions of the river and its tributaries. Returning to Pondicherry, he made another excursion to the islands and the Straits of Sunda, examining principally the eastern coasts of Java, in the districts of Buitenzorg and Bantam, where Raffles and Horsfield, Khul and Van-Hasselt, had previously toiled in the same vocation, and finally, on account of his health, returned to his country by the Isles of France and Bourbon, and the Cape of Good Hope. The results of this expedition were by his own account, 25 mammalia; 240 birds; 60 reptiles; 250 fishes; 300 mollusca; 500 insects; and 10 crustacea; in all, 1385 subjects, (it may be remarked, that those which had been met with in Persia were unfortunately lost before their arrival in France,) and among these, more than 360 new species or genera were said to be discovered,—a fact which we rather doubt, and which is scarcely borne out by the volumes now before us. Arrived in France, these were put under the care of MM. Isid. Geoffroy Saint Hilaire, Lesson, Valenciennes, Deshayes and Guerin; the historical and botanical portions being entrusted to Belanger. The present volumes, the one an 8vo of descriptive letter-press, the other a 4to atlas of illustrative plates, are devoted to Zoology alone, and we shall now shortly notice them.

Mammiferès par M. Isidore Geoff. Saint Hilaire.—Commences by some short general remarks upon Geographic Zoology.—Next a tabular view of the monkeys of the old world is given, intended as a supplement to what Humboldt has done for those of the new. To Humboldt's Synopsis a considerable number will now have to be added; and such is the progress of zoology, that in the last two years, M. Geoffroy's present list can be yet enlarged. In conclusion, a table is given showing the species of Desmarest and those of Geoffroy. Of the first, 42 species are given as really authenticated; in the last they are increased to 50. In the first, 4 are held to be altogether suppressed as synonymous or false, and 3 as doubtful. In his own list, 8 are styled as resting upon indifferent authority, and the total number recorded in 1834 are estimated at 58. Geoffroy next procceds to describe five species which he considers new, but without reference to their being procured during the expedition of Belanger, or of being natives of India. Two of these are figured, Semnopithecus cucullatus, Geoff. a native of the coast of Malabar, and vicinity of Bombay, and somewhat allied apparently to the S. maurus; and Macacus aureus, Geoff. also a native of India and the Islands, and previously noticed as the Cercopithecus mulatta.

Among the Cheiroptera, five species are described, and Vespertilio Belangerii, Geoff., considered new, is figured, inhabiting the coast of Coromandel, and the houses in the vicinity of Pondicherry.

The genus Tupaia of Raffles is first noticed among the "Insectivores." Speaking of the discovery of this curious genus, he says, it has been sometimes attributed to Raffles, sometimes to Diard; but the truth is, that it belongs to neither of these travellers, but to M. Leschenault de la Tour, who sent a specimen to the Paris museum in 1807. The known species seem to be under a certain confusion, the young and adult being similarly named at one time, and the reverse at another, by various authors. But M. Geoffroy thinks that the collection of Belanger possessed another, perfectly distinct from any of the states of the formerly known animals, and it is described and figured under the title of "Tupaia du Pegow." It is confessedly, however, nearly allied.

The genus Sorex next claims attention. Five Indian species are noticed, with some useful observations, and a table of the distinctions which separate some of the allied species. Four African species are also indicated.

Of the Carnivora, a new Felis is described and figured under the title of F. rubiginosa; it is most closely allied to the F. torquata of F. Cuvier, is about the size of the domestic cat, and was found in the higher woods in the vicinity of Pondicherry. A new genus is established under the name of *Melogale;* but in our correspondence with Mr Gray, that gentleman considers it as the same as his genus *Helictes,* described in the proceedings of the Zoological Society; and M. personata, Geoff. as probably identical with *Gulo orientalis* of Horsfield. It was found by M. Belanger in the vicinity of Rangoon. The entire length of the animal is about one foot one inch without the tail, that member, being wanting in the specimen, is supposed to be about eight inches. The dental system is

Upper jaw.	6 incis.		*Under jaw.*	6 incis.	
	2 can.	6 false mol.		2 can.	8 false mol.
	10 mol.	2 can.		12 mol.	2 can.
		2 tuberc.			2 tuberc.
					Total, 38.

The Mammalia are concluded by the "Rongeurs." Five squirrels are described, a hare, and a species of Spermophilus, the only animal noticed from Persia; a figure is given under the title of S. concolor, Geoff. The entire length of this little animal is about thirteen inches, of which the tail is three. The general colour is a pale-fawn, darker at the upper parts, and the tail, flattened and square at the end, is terminated by a black ring, then one of white, and lastly another of black, more indistinct. It was met with in the vast plains in the Persian province of Azerbaidjan. It burrows, and conveys grains to its retreat, therefore it is eagerly sought to be extirpated,

Oiseaux, par René-Primevere Lesson.—Commences by an essay on the geographical distribution of birds, containing general observations on this subject. The second chapter is entitled, "Description de plusieurs espèces d'oiseaux nouvelles, ou quelque autres encore incomplétement caractérisees dans les auteurs." The whole number of birds here described is thirty-nine; many of these, however, are neither from India or from the collection of Belanger, and we shall confine our notice to those which have been thought worthy of being figured, or have been brought to Europe by our traveller.

Pernis maculosa, Less. a name applied on account of the mottled state of the plumage. From the dimensions, twenty-two inches in length, this seems the immature state of the P. apivorus, where white much predominates. *Melias tristis*, from the neighbourhood of Pegu, is figured as new, while a doubt is held out that it may be the Phænocophaus melanagnathus of Horsfield (Trans. Linn. Soc.) *Garrulax Belangerii*, Less. considered new, and procured during the expedition of Belanger. The bird figured under this title is the Corvus leucocephalus of Hardwicke, (Trans. Linn. Soc.) the Glandarius leucocephalus of Gould, (Illust. Himal.) From this and another bird figured under the title of Gar. rubrifrons, Less. that gentleman has formed his genus *Garrulax*, allied to Turdus, he thinks, and to be placed after Myophonus. They nevertheless appear to us to come much closer to Glandarius, if they can at all bear separation. The first was procured at Pegu, the latter, Java. *Cryptonix Dussumierii*, Less. is certainly the C. niger of Vigors; but while M. Lesson has given this bird a new appellation, he at the same time advances another theory. The males of this genus, he remarks, have the eyes always surrounded by a bare and turgid space; in his C. Dussumieri, the cheeks are entirely covered with feathers, hence it *must be* a female (an alternative not necessary,) and is in reality that sex of the C. coronatus, while the birds which we have been in the habit of considering the female of this species, and the figure of the Planches Colories (Pl. cccli.) is a young male in immature plumage. The species described are from the Straits of Malacca, and, he adds, is very rare. Neither the C. coronatus, nor this black bird, however, seem uncommon in British collections, or in those of the dealers. *Phasianus Reynaudii*, Less. M. &. F., approaches close to the Ph. lineatus of Latham; indeed, in our correspondence with Mr Gray remarks, that it is the same, "as I have proved by comparing the figure with the original drawing in possession of the veteran English ornithologist." Drawings which we have lately received, taken from recent specimens, however, seem to differ somewhat from Lesson's figure. The female, we believe, has not been previously represented. *Otis aurita*. Figured in an immature state. This appears a very rare bird. Few collections possess it adult. The Museum of Paris has it not. M. Lesson found it on the coast of Coromandel, and remarks, "Nous ne connaissons point de figure de l'individu adult." If he will examine Forbes' Oriental Memoirs, he will find one; and in Illust. of Ornith. by Sir W. Jardine and P. J. Selby, three, of the adult male and female, and of the immature young somewhat similar to what he has represented.

Reptiles, par Rene-Primevere Lesson.—This portion of the work is confined to the mere descriptions of thirty-three species, seven of which are figured. One or two new genera and families are proposed, but the characters are so slightly and shortly given, that it is not necessary to notice them. And *Tetraonyx*, Mr Gray remarks, appears to be formed from an imperfect specimen of a young *Emys*. The same gentleman considers Emys Belangerii as identical with E. trijuga; E. flavonigra as E. thuga; and E. trigibbosa as E. tecta.

Poissons, par A. Valenciennes.—Commences by a few short preliminary observations. Upon the coast of Malabar, to judge from the collection of Belanger, and the fishes also procured by Dussumier, the family of the Scienoides among the Acanthropterygii, and of the Clupeadæ among the Malacopterygii are the most numerous. At the same time the absence of many jugular fishes is particularly remarkable upon a generally sandy shore; and the Apodes also seem few in number. The fresh waters possess some curious forms, particularly of the Cyprinoides, of which M. Belanger collected a considerable number, but in the river fishes he has been in a great measure anticipated by the work of Hamilton Buchanan, although that author is not perhaps always correct in the generic situation of his species. Eighteen species are in all described, of which ten are figured. *Pterois* is a curiously formed genus, and the members of it ascend the fresh waters periodically like the Salmonidæ. They also appear to undergo a seasonal change of colour. The abode in the fresh water is, however, so detrimental, that they become weak, and are even carried down the stream upon their sides, while after a sojourn in the salt water, their active habits and brilliant silvery tints are speedily recovered. M. Valenciennes asks what is the cause of this, and remarks, "that we cannot believe that the act of spawning is the only cause of the disease of those fishes, *for it is certain that many species of salmon periodically enter the river, and do not every time spawn.* (Car il est incontestable, que plusieurs espèces de saumon entrent periodiquement dans les rivieres, et qu'elles n'y fraient pas chaque fois.) A fact stated so, by an ichthyologist of such celebrity, must have some weight. We are not aware that it is a common fact, or a fact at all, that any of the salmon periodically enter rivers and return without spawning; but as he promises to dilate upon these and other points when treating of the Salmonidæ in the Histoire Naturelle des Poissons, now devolved upon him, we shall without further remark wait patiently but anxiously for the appearance of the volume. The greater portion of the fishes noticed in this essay have been previously described in Histoire Nat. des Poissons, or by Hamilton Buchanan, to whom reference is frequently made.

Mollusques, par G. P. Deshayes.—Commences by " Reflexions sommaires sur l'importance de l'etude des mollusques appliquer à l'histoire chronologique du globe terrestre." Of the shells twenty-one species are described, and they are all figured; among them seven from the land and fresh water, which are interesting on account of so few, until lately, from these localities being attended to. Helix, Cyclostoma, Planorbis, Limnea, and Paludina. The essay is concluded by an interesting table of the living shells of India and the Mediterranean, found in Europe in a fossil state, with the localities where the fossils occur.

Insectes, par F. E. Guerin.—Commences by an essay, " Essai d'un nouvelle arrangement des hemipteres de la section des Homopteres, et revision de la tribu des Fulgorelles." Several new genera are proposed; forty-one species are described as new, and all figured; and it may be mentioned that the authors of the mollusca and insects have added Latin specific characters to the species they describe, which we consider an improvement upon the other essays in the volume.

Zoophytes, par R. P. Lesson.—Only two species are described, the one Tubastrea coccinea, Less. from one of the Society Islands, and Sarcophyton lobulatum, Less. from Port Praslin in New Ireland. Both are beautifully figured.

III.—*Neue Wirbelthiere zu der Fauna von Abyssinien gehörig, entdeckt und beschrieben, von* Dr Edward Rüppell. Lieferung 1, 6. Frankfurt, 1835-1836.

This work is a continuation of the former " Zoologischen Atlas zu der Reise im Nördlichen Afrika," published by the very enterprizing and scientific traveller whose name it bears, and to whose energies the town of Frankfort on the Maine is indebted for a zoological museum of the first importance, indeed, so rich, that it must be rated next to the large national collections of England, France, Prussia, and Holland, and before any others of the principalities or towns of Europe.

This collection of Abyssinian Vertebrata is published in numbers. It commenced 1st January 1835; a number appears every three months, and twelve will compose the present series, so that we may expect its completion in January 1837. Six numbers are now before us; of these one is devoted to Mammalia, two to Birds, one to Reptiles, and two to Fishes.

The first plate of the Mammalia represents a beautiful species of the rare African genus *Colobus*, C. guereza, Rüpp. discovered in the wooded and marshy valleys of south and west Abyssinia, (in the provinces of Godjam and Kulla.) It is jetty black, white cheeks and throat, with a fringe of long white hair arising from the back and hanging down upon the sides, looking as if it were covered with a long veil; but we add the specific characters.

Colobus guereza, Rüp.—Corpore, facie, sincipite, auchenio et cauda ad dimidiam usque aterrimis; tænia frontali, regione temporali, parauchenio, mento, gutture et cingulo ab interscapulio ad primnam elongato,—villis sericeis longissimis, præcordia hypochondria et lumbos obtegentibus—candidissimis, niveis. Cauda parte posteriore albicans floccosa, callus analis colore nigro, albo limbato.

Macacus gelada, Rüpp. occupies plate second, a large species of ape. And under the description of this species, it is mentioned that the little lemur figured by R. Brown in his Illustrations of Zoology (t. 44,) which he had referred to Octolicnus Senagalensis, is quite a distinct species. Three species of antelope and a goat are also described. *Ant. defassa,* Rüpp. Tab. 3, a species which has been alive for some time in the gardens of the Zoological Society, where it is named Ant. sing-sing. *Ant. decula,* Rüpp. Tab. 4, very like Ant. scripta, but wanting the dorsal stripe, and some of the transverse ones on the hinder part of the back. *Ant. beisa,* Rüpp. Tab. 5, a very fine species, and probably the milk-white antelope described by Pennant from a drawing made in Persia, and from which Pallas established his A. leucoryx. It is quite distinct, however, from the A. leucoryx of Lichtenstein, which comes from the Cape; and, if these surmises should prove correct, the recovery of the species is very interesting. Ruppell obtained it living in small families during the rainy season, in the low moist valleys on the coast provinces of Massaua.

A. beisa, Rüpp.—Mas adultus. Antelope cornubus longis, rotundatis, tenuibus, rectis, parte basali annulatis. Facies exalbida, vittis tribus ex fusco umbrinis valde distincta, quarum una a fronte ad regionem nasalem lata, sed inter oculos angustior, altera a fronte per oculum adgenam, tertia a regione parotides ad gulam producta. Ejusdem coloris sunt,—tænia, a gula collo anteriore ad sternum decendens, ubi divisa ad latera pectoris et abdominis decurrit,—armilla antibrachii, et caudæ apex comatus. Corporis colore isabellino, pectoris et abdominis albicante, juba cervicali et dorsali, rubiginosa.—Fœmina adulta differt a mare juba cervicali et dorsali corporis colore.

Capra walie, Rüpp. Tab. 6, is very like the C. ibex, but it has a prominence between the base of the horns, and the legs are coloured like those of C. Nubiana and C. Siberica.

The birds described and figured are three species of hornbill, Buceros cristatus, B. limbatus, and B. flavirostris, all somewhat allied, however, to species already known. *Corythaix leucotis,* Rüpp. Tab. 3, a new species, at once distinguished by the white patch at the extremity of the auricular feathers, and making this beautiful genus now consist of six.

Corythaix leucotis, Rüpp.—Rostro coccineo; palpebris superioribus papillis carneis; pileo crista plicatili obscure viridescenti ornato; collo et pectore laete prasinis; abdomine et tibiis canescentibus; dorso, alis et cauda ex violaceo viride-splendentibus; remigibus ex sanguineo purpurascentibus viride marginatis —macula anteocularis et plaga auricularis ad collum decendens niveæ.

Chizaerhis zonurus, Rüpp. Tab. 4. Very interesting, as being the second species of the genus, and observed by our traveller in the province of Dembea, &c. It is nearly of the size of the Ch. (musophaga) variegatus, and will be at once distinguished by the form of the crest, and the white band on the tail.

Ch. zonurus, Rüpp.—Rostro citrino, capite et collo ex badia fuscentibus, plumis nuchæ elongatis, lanceolatis, albo marginatis, gastraco et tibiis ex umbrino et albido variis.—Corpus supra ex umbrino cinerascens remigibus nigricantibus; eorum vexillis internis macula alba. Rectrices dilute brunnæ, earum concolores, quatuor externæ media parte taenia ex albida lata, apicibus fuliginosis.

Corvus crassirostris, Rüpp. Tab. 8,—Considered by Rüppell as distinct but closely allied to the strong-billed species of southern Africa. The distribution of the European crows is mentioned here (p. 10,) from which it appears that the C. cornix is pretty abundant during winter between Cairo and Suez. C. monedula and frugilegus in lower Egypt, and Pica vulgaris during winter in lower Egypt. C. affinis and Capensis are described, but a diagram of the heads and bills is only given. *Ptilonorhynchus albirostris,* Rüpp. Tab. 9. This is an interesting form; and, if true to the type of the genus in which Rüppell has placed it, will show a wider distribution than what was imagined, the form not having been hitherto seen on the African continent. It is a gregarious species; and, to judge from the habits and distribution of colour, and the figure which we have in this atlas, we should be inclined to consider coming closer to the Lamprotorni. The male and female are figured.

Pt. albirostris, Rüpp.—Mas, colore supra et subtus nigro splendore cæruleo, remigibus primaris rubiginosis, apice nigro, tectricibus majoribus et cauda nigris, rostro albido. Fœm, capite collo et pectore cinereo cærulescente.

Three Lamprotorni, L. tenuirostris, L. rufiventris, L. chalybeus. *Oriolus moloxitta*, Buffon, Tab. 12, Fig. 1, which appears hitherto to have been confounded by various authors, as identical with some of the other black-headed species. *Prionops cristatus*, Rüpp. Tab. 12, Fig. 2, interesting as being a second species of the genus, perhaps identical with Lanius cineraceus of Latham. *Perdix melanocephala*, Rüpp. Tab. 5, allied in the form, colouring, and distribution of the markings to the little group, of which the red-legged partridges, P. rubra, saxatilis, and their allies of southern Europe and northern Africa are typical. A very beautiful bird, and apparently rare, as only two specimens were procured.

Perdix melanocephala, Rüpp.—Vitta frontali supra pileum ad nucham usque ducta,—infraorbitali, et collari ab regione parotidea, quæ ex albido et nigro striolata, per latera colli ad pectus plaga angustiori elongata, nigris; vitta superciliari lata et gula nivea; collo et medio abdominis ex isabellino rufescente; corpore supra schistaceo, plumis margine rufescentibus, infra dilutiori; hypochondriis fasciis albescentibus utrinque nigro marginatis; cauda supra subtilissime undulata; rostro et pedibus colore corallino.

Perdix Erckellii, Rüpp. Tab. 6, coming into the division which contains the P. nudicollis of authors.

P. Erckellii, Rüpp.—Pileo castaneo; frontis et faciei plumulis rigidioribus nigris albo striolatis; macula post oculari et gula albis; plumis colli castaneis albo marginatis—pectoris griseis, stria intermedia lanceolata castanea—abdominis, crissi et hypochondriorum albicantibus stria intermedia lanceolata et margine castaneis.—Dorsalibus et alarum tectricibus hepaticis, margine castaneis, tergo, uropygio, rectricibus et remigibus hepaticis, secundarium vexillis externis colore dilutiori undulatis, rostrum et pedes colore corneo, pedes maris bicalcarati.

A fine Otis, O. melanogaster, Rüpp. Tab. 7, is figured; the conclusion of the description is, however, deferred till next number: *melanogaster* is not a very good appellative for any of the bustards, as the summer or breeding plumage of nearly all is deep-black on the lower parts.

The part containing the Reptiles consists of figures and descriptions of three tortoises. *Pentonyx gehafie*, Rüpp. Tab. 1, somewhat similar to the Test. subrufa of the Cape of Good Hope, but differs from it by a character which also separates it from all the other tortoises known, viz. the pectoral pair of plates are triangular, and do not reach to the centre of the sternum. If many specimens had not been found, one would at first sight have been induced to have considered this structure as an accidental formation. The other true chelones belong to the genus *Chelonia*, the species of which are so difficult to determine, on account of the great variation which take place in the form of the shield at the different periods of their growth, and in the number of plates of the shield and the head of the animal, in different specimens of the same species. *Carretta bissa,* Rüpp. Tab. 2, and *C. olivacea,* Eschscholtz, Tab. 3. *Agama colonorum,* Daud. Tab. 4. *Stellio cyanogaster,* Rüpp. Tab. 5. *Trapelus flavimaculatus,* Rüpp. *Hemidactylus flavi-viridis,* Rüpp.; and *Pristurus flavipunctatus,* Rüpp. Tab. 6. are all interesting, as being figured and coloured from the living animals. And the genus *Pristurus,* apparently belonging to the slender-toed Geckoes, and very peculiar for having a long, much compressed tail, serrated on both its edges, is now described and characterized for the first time.

Pristurus, Rüpp. Char. Gen.—Caput subdepressum, breve, anticè rotundatum: Nares laterales prope apicem rostri: oculi magni, pupilla nocturna, subrotunda: membrana tympani profunde latens: lingua crassa, depressa, apice integro: dentes maxillares integri æquales, uncinati · cutis trunci sublævis, subtilissime reticulata: pedes pentadactyli, digiti graciles, rotundati, elongati, uncinati: cauda compressa, elongata, supra et infra carina serrata: pori femorales nulli.

Of the fishes, forty-six species are described and figured in the two numbers already published, most of them are coloured from the fish when alive. Among them are what Dr Rüppell considers the types of four new genera, of which we shall add his characters.

Enneapterygius, Rüpp. Char. Gen.—Caput alepidotum, preoperculum carinis duabis, operculum supra pinnas pectorales elongatum. Os labiis carneis, dentibus setaceis minutissimis per multis armatum, membrana branchialis sub gula continuata, radiis 7. Corpus squamis magnis, margine serrato; linea lateralis sola parte anteriore expressa, pinnæ dorsales tres, duæ anteriores spinosæ. Pinnæ ventrales thoracici, radiis binis veluti Blennii. Allied to Scorpaena. Species, Enneapt. pusillus, Rüpp.

Gazza, Rüpp. Char. Gen.—Corpus compressum, cute squamis minutissimis tecta ore mediocri, multum protractili, unica serie dentium uncinatorum armata, e quibus nonnulli fortiores elongati. Dentes palatinalis et vomerales nulli preoperculum margine duplici, externo parte inferiore serrato. Characteres reliquis generis Equula præter spinas ad latera pinnæ dorsalis et analis, quæ tactu sed non visu conspicuæ sunt. Allied to Equula. Species, *Gazza equulæformis,* Rüpp.

Pseudochromis, Rüpp. Char. Gen.—Dentes in utraque maxilla uniseriati, minuti, conici, antice fortiores, irregulares, uncinati; dentes palatini sphæroidei minutissimi, triplici plaga dispositi, arcum semilunarem æquantes; dentes pharyngei uncinati, setiformes; rictus oris minutus. Labia mediocria; os non protractile; operculum angulo postico elongato, preoperculum margine integro, utrumque squamis minutis tectum; apertura branchialis sub gula continuata; membrana branchialis radiis sex. · Linea lateralis interupta; radii tres anteriores pinnæ dorsalis et analis spinosi, reliqui flexibiles. Allied to Julis, Cuv.—Species, Pseud. olivaceus, flavivertex, Rüpp.

Xenodon, Rüpp. Char. Gen.—Dentes in utraque maxilla 8, ordonati, compressi, cestiformes, excepto pari secundo maxillæ superioris, qui cuneiformes ceterisque longiores; characteres reliqui a Balistibus non different.—Species Xen. niger, Rüpp.

In conclusion of this short analysis, we may observe, that the plates are lithographic, and are accurately drawn and well coloured.

BIBLIOGRAPHICAL NOTICES.

A History of British Quadrupeds. By THOMAS BELL, F. R. S., &c. Illustrated by a wood-cut of each Species, and numerous Vignettes. Nos. i. ii. London, Von Voorst. 8vo. 1836.

THIS work is commenced upon the same plan, and in the same beautiful style of typography and wood-cutting with Mr Yarrell's British Fishes* to which we expect it will prove a worthy companion. The whole of the first number and the greater portion of the second, are devoted to the *Cheiroptera;* and although the size of the wood-cuts is rather against the marking of the distinctive characters of this difficult family, this is at once remedied by vignettes devoted to these parts, being of the natural size, which renders the explanation distinct, and the characters easily seized upon. These are taken by Mr Bell principally from the proportions of the ear and tragus, and from the relative proportions of the ear to the head and tragus, together with the formula of dentition. The notch-eared bat, Vesp. emarginatus, Geoff. is given as British, on the authority of the meagre description of its discoverer, who says that it was received, "at some distance from Dover." This increases the British list of *Vespertiliones* to twelve, eleven being described in Jenyns's Manual, and the V. emarginatus of that author being in the present work considered identical with the V. Daubentonii, Leis. The work will be completed in eight numbers, at 2s. 6d. each, the first of which appeared on the 1st July, and we promise an analysis upon its completion.

Rumphia.—Sive commentationes botanicæ imprimis de plantis Indiæ orientalis, tum penitus incognitis, tum quæ in libris Rheedii, Rumphii, Roxburghii, Wallichii, aliorumque recensentur, auctore C. L. BLUME.

COMMENCED under the care of Professor Blume, as a supplement to the "Flora Javæ" of that botanist, of the same size, and similar in type and execution. It will be completed in thirty-six livraisons, forming three folio volumes. It will appear every three months. The price of each livraison to subscribers will be five florins and a-half.

---

* We may announce the completion of Mr Yarrell's work, which it will soon be our duty to notice more minutely. The two last numbers were received too late to prepare an analysis for our present number.

Flora Metropolitana, or Botanical Rambles within thirty miles of London, intended for the Student in Practical Botany. By DANIEL COOPER. 12mo. Pp. 139. London, S. HIGHLEY, 1836.

SCARCELY a "Flora" in the proper acceptation of the name. Partial lists are given of the species found about particular villages, heaths, woods, &c. One hundred and fifty places are named, and each is followed by a list of the plants which grow near it. In a few, the most common are even recorded, but generally some of the rarer species only, and the nature of the subsoil is occasionally mentioned. The work will be useful to the London botanist as a companion in his excursions. A list of the "land and fresh water shells found in the environs of London," with the localities of each, is appended to the volume.

The Ornithologist's Text-Book, being Reviews of Ornithological Works, with an Appendix containing Discussions on various topics of Interest. By NEVILLE WOOD, Esq. 12mo. Pp. 232. London, W. Parker, 1836.

THE idea of the work is good, and a volume comprising tables of the various ornithological systems, and a list of all the works upon this branch of Natural History, (either arranged alphabetically or chronologically,) with a short analysis of their contents, would be of much use to the ornithologist.

The present work is divided into two parts and a supplement. In the first, or "notices of ornithological works," 109 notices are given, (the various works of an author being generally placed together;) but they are written much too superficially to be of real use, and without a sufficient acquaintance with the works analyzed: some have not been seen at all, such as Illiger's most useful prodromus, and it is passed with that acknowledgment only. Merrem's "Icones et Descriptiones" have not been seen either, and it is scarcely fair to add to this acknowledgment, "but it is probably of little or no value at the present day;" and for several of the others a review from another work has been substituted for the opinion of the author. Part II. contains tables of seventeen systems, commencing with that of Willoughby, and to its extent this is useful as a reference. The supplement contains some additional notices of books; "Hints for a new and complete work on general ornithology;" "On the establishment of a new magazine of natural history;" Habits of the Ivy wren (Anorthura troglodytes, Morris,") being an extract from a work of the author's then in the press; and some observations "on the English nomenclature of birds."

British Song-Birds, being popular Descriptions and Anecdotes of the Choristers of the Groves. By Neville Wood, Esq. 12mo. Pp. 408. London, W. Parker, 1836.

In most of the works entitled "Song" or "Singing-Birds," many species are introduced, which to our ideas have no business there, but we have no right to quarrel with the tastes of the authors, although we cannot perceive the title of the buntings, or common sparrow, or stone-chat, or wheatear, to be called "choristers of the groves." The present volume contains descriptions of seventy-three species, and will be useful to those who possess no work of greater extent. We discover nothing new in it, but there are some pretty descriptions, and one or two interesting anecdotes. One favourite chorister we miss, not certainly of the grove; but if those of the brake and barren waste are admitted, so may he of our mountain torrents. Mr Wood can never have heard the plaintive melody of the water-ouzel (Cinclus aquaticus.) To the nomenclature we decidedly object; it is often inappropriate, and many of the names may be at once thrown out by using the very rules which our author advocates. We dislike also repetition of the remarks against compilers, and the frequent and sometimes not very gently couched observations upon the works of a living author.

Collection de Perroquets, pour faire suite à la publication de Levaillant, contenant les espèces laissées par cet auteur, ou recemment decouvertes, destiné a compléter une monographie figurée de la famille des Psittacidés. Par le Dr A. Bourjat Saint Hilare. Fol. et 4to.

A work with the above title is about to be commenced as a supplement or continuation of Levaillant. The figures will be lithographic, and are drawn by M. Werner. It will be published in monthly livraisons of four plates each, size, folio and quarto, to correspond with the different editions of Levaillant's work. The price twelve and fifteen francs. From 100 to 150 plates are proposed to be given, but if each is devoted to a species, and the sexes are given where the difference is great, that number will not suffice to represent the additional species known at the present time.

Histoire Naturelle des Poissons. Par M. le Baron Cuvier, et M. A. Valenciennes. Tome Onzieme. 8vo. 1836.

The second volume of this important work which has appeared since the death of its illustrious projector. It contains the families of the *Mugilloides* and *Gobioides*. The first, besides the true mullets, Mugil, Linn. has included in it *Cestræus*, a genus formed from two fishes natives of the fresh waters of the island of Celebs. *Dajaus*, of which the Mugil monticola of Bancroft, inhabiting the fresh waters of the Island of Jamaica, is the type and only species. *Nestis*, frequenting the coasts of the isles of France and Bourbon, limited to two species, and *Tetragonurus*, Risso, formed from the Mugil niger of Rondelet, apparently a very rare Mediterranean fish, and now standing under the title of Tetragon. Cuvierii, Risso. Of Mugil fifty-two species are described,—an immense increase to the number previously known. Of those frequenting the British coasts it is interesting to know that the M. curtus of Yarrell, described from a single specimen of about two inches in length, taken at the mouth of Poole harbour, has been a second time met with by M. Bailon in the bay of the Somme, near Abbeville. One specimen in this instance has also only been met with, about eight inches in length, and M. Valenciennes is of opinion that the characters given by Mr Yarrell stand confirmed.

The *Gobioides*.—Cuvier appears at first to have formed two families. The Blennioides having six rays to the branchial membrane, and the Gobioides having only five, in the present volume they are retained under the last. The family is remarkable as containing several species which are considered viviparous; and the manner in which the female is impregnated has always been a subject of interest to the naturalist, the uncertainty being, whether it took place internally or externally, and we regret that it is still left in doubt. Cuvier has expressed his opinion to be in favour of internal impregnation, " mais avec circonspection;" and M. Valenciennes, while he leans to the same, is unable to satisfy himself from the form of the parts how it can be effected. The family is commenced with the Blennies (Blennius) of which thirty species are described. Among those natives of the British seas that figured in Mr Yarrell's work under the title of " The Crested Blenny, Bl. palmicornis," is considered distinct and new, and is dedicated to the commemoration of our own worthy ichthyologist, Bl. Yarrellii. Valenciennes has never seen the true B. palmicornis except from the Mediterranean, and he has not seen a specimen of Yarrell's fish; but he remarks of it, " we find this species already noticed in Fleming and Nilsson, who have confounded it with the Bl. galerita of Linn. Mr Yarrell, perceiving their error, has taken it for our palmicornis, but this has never more than from 33 to 35 rays, while his species has from 50 to 51." Mr Yarrell's specimen was procured by Dr Johnston near Berwick.

The Pholis of Fleming is adopted. A new genus is formed from the Blennius rostratus, Solander, a native of the new Guinea seas. It is named from the large developement of the canine teeth, *Blennechis* (βλέννος and εχις,) and several undescribed species are added. Another contains a single species, Bl. Bosquianus, Lacep. In these the character of the gills of Blennechis are combined with a wide gape, but with a single row of regular teeth on the outer part of the jaws only, and has been termed *Chasmodes.* The other genera admitted are *Salarias,* remarkable for their moveable teeth, and 33 species are described. *Clinus,* into which the Bl. argentatus, Risso, the only European species will range. *Myxodes,* formed from a single species, a native of the N. Holland seas, Cl. Australis, Cuv. differing in having the first rays of the dorsal fin separated and advanced upon occiput in the manner of a crest. *Cirrhibarbes,* a native of the seas of South Africa. *Tripterygion ;* Tript. nassus, Risso, a native of the Mediterranean, is typical ; the dorsal fin is divided into three parts or divisions. *Gulnellus, Zoarces, Anarrhichas,* of the latter a second species A. leopardus,) Agass. is admitted on the authority of a single specimen in the collection of Munich : and *Opisthognathus,* of which a single species, scarcely perfect, was known to Cuvier, on the publication of the Règne Animal. Another has since been discovered from the coast of South America, and is dedicated to the Baron.—Opist. Cuvierii, Val.

Histoire Naturelle Generale et Particuliere de tous les Genres de Coquilles Univalves marines à l'etat vivant et fossiles, publie par monographies. Par P. L. Duclos. Genre Olive. i. ii. Livraison. Paris, 1835. Folio.

The two parts published contain eleven plates, on each of which several species of the genus are figured. They are beautifully executed, but, from the expensive style in which the work is brought out, it is to be feared that even the genus now being published will never be finished. The text consists merely of a tabular list of the species to be figured, and an index, occupying in all two leaves. —J. E. G.

Observations on the Genus Unio, together with descriptions of new Genera and Species in the families Naïades, Conchæ, Columacea, Lymnæana, Melaniana and Peristomiana. By Isaac Lea. 4to, Philadelphia, 1836.

This work consists of four papers, published at intervals in the

Transactions of the American Philosophical Society. It is occupied principally with descriptions of various species of Uniones, most of them American, with a few from China, and has added greatly to our acquaintance with this large genus. To this are appended observations on the species of Naïades described by Lamarck; and the descriptions of some new species of shells belonging to other freshwater or land families, each species described being illustrated with a characteristic coloured figure.

Mr Lea has charged some of his countrymen with a fault of which he is himself not guiltless—that of capriciously changing the names of several species; and while he has, rightly perhaps, brought together as varieties several of the species described by other authors. he has, in other instances, separated individuals from species on very slight differences. Some of his new species have been previously characterized. Unio necklinianus, for example, was described many years ago by Mr Swainson: U. Murchisonianus and Symphynota magnifica are described and figured in Griffith's Translation of Cuvier's "Règne Animal," Cyrena Javensis is C. Childrenæ of Wood's Supplement; and C. rotundata is only the adult of the same species. Symphynota bialata is the young state of Dipsas plicata of Dr Leach; Melanopsis princeps appears to be only the young of Pryena ater; the Lymnea imperialis is certainly nothing but the very young state of a Bulimus, probably B. hæmastomus; and the shell on which Mr Lea has formed his new genus Aphrodite, and which he considers should be placed after the genus Pyrena, is a well known one, figured by Chemnitz and described by Lamarck, under the name of Cardium Grœnlandicum. It is not uncommon on the coast of Greenland, and only differs from the other cardia in the small size of its teeth, which are most developed in the younger specimens. Hence Montagu, who considered it a new species, called it Cardium edentula.—J. E. G.

Erpetologie Generale ou Histoire Naturelle complete des Reptiles. Par M. C. Dumeril and G. Bibron. Vols. 2, Paris, 8vo.

This work, which forms one of an excellent series publishing in Paris under the title of "Suites à Buffon," is intended to give a complete history of reptiles. The first volume is principally occupied with a description of these animals and their organization in general, to which is appended a list of works on the same subjects in chronological order. It contains likewise the methodical distribution of the Chelonian reptiles into orders, families and genera; an account of their structure and manners, and a list of the authors who have treated of them in particular. The second volume contains the descriptions of the species of Chelonian reptiles: the distribution of the Saurians into their families and genera; an essay on their organization and habits; and a similar list of the books which treat of them.

The general observations are written by M. Dumeril; while every thing relative to the description and determination of the species and their synonyms, has been left to M. Bibron, now his assistant in the museum, and formerly the animal preserver of the department.*

It is much to be regretted that M. Bibron, with the characteristic inconsiderateness of a young naturalist, has deemed it necessary to change capriciously many of the established family, generic and specific names; but in so doing he follows many of the modern French authors, who thus affect to give a national character to their works. Thus he has named anew all the families of the Chelonian reptiles; he has changed the name of the genus *Chelydra* of Schweiger, which Fleming also had called *Chelonura*, to *Emysaura!* *Trionyx* of Geoffroy, which is the same as *Aspidonectes* of Wagler, must now be called *Gymnopsus;* and *Emyda* of Gray becomes the *Cryptopus* of M. Bibron!

M. Bibron has followed the arrangement of the Chelonians published by Mr Gray in his Synopsis Reptilium. He has given a very extensive list of synonyms, copied in a great measure from the elaborate paper on the synonyms of these animals written by the unfortunate Schweiger: and to those is added a very verbose description of the species.—J. E. G.

TRANSACTIONS AND PERIODICALS.—*British.*

The Edinburgh New Philosophical Journal. Conducted by Professor JAMESON. April to July 1836. Edinburgh. A. & C. Black. (Part 1st of Vol. xxi.) 8vo. (Continued from p. 99.)

I. *Zoology.*

DR GRAVES of Dublin, "Observations on the Sense of Touch, including an analysis of Weber's works on that subject," copied from the March number of the Dublin Medical Journal, p. 67.——JOHN GRAHAM DALYELL, Esq. "Farther illustrations of the propagation of Scottish Zoophytes." p. 88. Additions to a communication read before the British Association in 1834, and published in a previous number of the Ed. Phil. Journal. The remarks refer to the propagation of "Actinia, Alcyonum, Sertulariæ, Hydra tuba, Tubularia polyceps, and Cristatellæ."——Mr JOHN SHAW, "An acount of some experiments and observations on the Parr, and on the ova of the Salmon proving the parr to be the young of the Salmon," p. 99. Interesting experiments plainly detailed, but not "proving" the parr to be the young of the salmon. Whatever, nevertheless, may be the result of their continuation, they will be of importance either as additions to the natural history of the young states of the salmon, or as elucidating the history of the true parr. It is impossible to detail the author's experiments without transcribing the whole paper; suffice it to say, that Mr Shaw considers that the young of the salmon remain in the river two years before migrating to the sea; that they are during this period in the livery of the parr, and are known as such to anglers; that during the April of the second year they commence to perfect their change to the livery of fry, the scales becoming silvery and easily deciduous, and that they begin their migration downwards so soon as this is completed. The experiments do not proceed beyond this period of their growth.——Mr KING's temperature of quadrupeds, birds, fishes, plants, trees, and earth, as ascertained at different times and places in Arctic America, during Captain Back's expedition, p. 150, a simple table copied from the appendix of Captain Back's last Narrative.

---

* Discour. Prelim. p. x.

I. *Botany.*

Dr GRAHAM, " List of new or rare plants which have lately flowered in the neighbourhood of Edinburgh, chiefly in the Royal Botanic Garden, p. 154." " *Acacia lineata, Cunning.*; stipulis subnullis; phyllodiis lineari-spathulatis, subfalcatis, versus marginem superiorem uninervibus, oblique cartilagineo-mucronulatis, ramuloque rotundato pubescentibus; capitulis longe pedunculatis, subgeminis."—" *Begonia Fischeri*; caulescens, foliis oblongis, acutis, inæqualiter cordatis, dentato serratis, utrinque glabris, nitidis; stipulis ovatis, integerrimis; floribus masculis 4-petalis, petalis exterioribus rotundis, concavis, marginibus plano-revolutis; floribus fœmineis 6-petals, petalis ovato-lanceolatis, alis germinis inæqualiter rotundatis."—" *Begonia sanguinea*, Radd. in Spreng. Syst. Veget. ii. 625, caule ramoso; foliis inæqualiter cordatis, acuminatis, coriaceo-carnosis, glaberrimis, subtus sanguineis, margine crenulato revoluto; germinis alis tribus æqualibus."—" *Bletia patula*; foliis radicalibus, lanceolatis, plicato-nervosis; scapo elato, subramoso; floribus patentissimis; sepalis lanceolato-ellipticis, basi attenuatis, subæqualibus, patulis; labello cucullato, lobis lateralibus rotundatis, intermedio emarginato transverse plicato, disco lamellis 6, subramosis, inæqualibus."—" *Drosera filiformis*; introduced to the Edinburgh gardens in 1834, by Mr James Macnab, from plants found by him in a swamp above Tuckerton, New Jersey, U. S. scapis lateralibus, foliis lineari-filiformibus glanduloso-pilosis, dorso glabris canaliculatis, basi lanatis; staminibus 5; stylis 8, in paribus coalitis, basi." —" *Epacris microphylla*; Br. Prodr. Flor. Nov. Holl. calycis foliolis obtusiusculis, tubum corollæ æquantibus; foliis cordatis, acutis, pedunculum superantibus, lateribus erectis; spica apiciflora; ramulis pilosis."—" *Fritillaria ruthenica*; Wickstrom? caule subunifloro; foliis lineari-lanceolatis, imis superioribusque subternatis, illis obtusis, his, intermediisque sparsis, cirrhosis; floribus tesselatis cernuis.

The Magazine of Natural History. Conducted by J. C. LOUDON, Vol. ix. Nos. from May to August. (Continued from p. 101.)

I. *Zoology.*

WOOD on the Propriety of altering established Scientific Names in Natural History should they be erroneous, p. 337–342——WHITE on the Singing of Birds, p. 281–290; and at p. 432, there is a review of this paper by Mr CONWAY.——

WHITE on the length of Life of a species of Parrot; with suggestions for ascertaining the average period of existence of the whole animal creation; and an anecdote on a parrot, p. 347–350. The parrot appears to have died in not less than its 85th year.——BLYTH on the various seasonal and other external changes which regularly take place in birds, more particularly in those which occur in Britain; with remarks on their great importance in indicating the true affinities of species; and upon the Natural System of arrangement, p. 394–409.——WATERTON on the Habits of the Magpie, p. 225–9; of the Dovecot Pigeon, p. 343–6; and of the Stormcock or Mistletoe Thrush, p. 409–13.——MORRIS on the Habits and personal characteristics of the Crossbill, p. 413–16.——WATERTON and MORRIS on the office of the gland upon the rump of birds, p. 266–271; 323–26; 434–7. The discussion has been carried on in a flippant and acrimonious manner creditable to neither party, and very unsatisfactory to a naturalist in search of the truth. We need not, however, hesitate, to express our belief that Mr W. will be found to be correct in his opinions.——SALWAY'S notice of the discovery of the Skeletons of Swifts and Starlings in the tower of the church at Oswestry, Shropshire.——HOY on the capture of the Motacilla neglecta at Stoke Nayland, Suffolk.——ORD on the Habits of the Black snake.——WATERTON on the Habits of the Chegoe of Guiana, p. 290–293; to which the editor has judiciously appended a translation of Pohl and Kollar's account of the Pulex penetrans, by Mr SHUCKARD, with some excellent illustrative figures.——JOHNSTON on the Acarus Basteri, p. 353; Lamellaria tentaculata, p. 229; Asterias aranciaca, p. 298; Ast. endeca, p. 299; Ophiura Rosula, p. 231; and Gordius aquaticus, p. 355,——TEMPLETON'S Catalogue of the Annulose Rayed and Polypous animals found in Ireland, as selected from the papers of the late J. Templeton, Esq. with localities, descriptions, and illustrations, p. 233–240; p. 301–5; p. 417–421. The *Actinia monile* of Templeton is the young of *Act. senilis;* and his *Actinia margaritifera* is the common *Act. mesembryanthemum.*

II. *Botany.*

BABINGTON'S Localities of several species of British plants observed during the summer of 1835, p. 243–246.

Entomological Magazine. London, July 1836. (Continued from p. 192.)

With this number a fourth volume is commenced, to which we wish success, as it is a publication valuable on many accounts to the entomologist, but particularly so, for the various monographs it contains. It is prefaced by a short introductory address, and the minutes of the Entomological Club, the members of which association, in consequence of the valuable property they have acquired in collections of insects, books, and manuscripts, have found it necessary to frame an institution and code of laws. Among the resolutions we are glad to observe that a special object of the club is to form a model named-cabinet of insects, *unquestionably British*, and another, that all entomologists consulting the library or Cabinet shall be at perfect liberty to make notes, memoranda, descriptions, or drawings of any insect, or from any book, or manuscripts contained therein. Art. 1. FRANCIS WALKER, Monographia Chalciditum, (continued from Vol. iii. p. 496.)——*2d.* Wanderings and Ponderings of an Insect-hunter.——*3d.* A. H. HALIDAY, M. A. Essay on Parasitic Hymenoptera, (continued from Vol. iii. p. 147.)——4. Observations on certain curious indentations in the old red sandstone of Worcestershire, and Herefordshire, &c. by Jabez Allies, Esq. one of the council of the Worcestershire Natural History Society, &c.——A critique on a work we have not seen, and unconnected with Entomology.——5. New group of Orthoptera, Family Mantides, by M. A. Le Febvre, (extracted from the Annales de la Société Entomologique de France.) The curious insect here noticid was found by the author in the Egyptian deserts, where no other insect upon which it might prey could be detected, and where the desert is entirely devoid of vegetation.——6. A list of the Coleoptera, taken in the county of Sutherland in June 1834, by Mr J. Wilson, F. R. S. E. &c.——7. Entomological notes, by W. E. Thuckard. Among these an instance of curious hermaphroditism, or rather monstrosity, in *Anthophora retusa*, Linn. the captive of *Hylecætus dermestoides*, Fab. in Sherwood Forest, and *Carabus intricatus* upon Horsley Downs.——8. List of Entomological works.——9. Varieties.

Companion to the Botanical Magazine. By Sir W. J. Hooker, Professor of Bot. in the Un. of Glasgow. Parts xiii. xiv. (commencing Vol. ii.) 8vo. Curtis, London, 1836.

We take the opportunity of the commencement of a second volume of this work, to begin our regular notice of the contents; and to those who are acquainted with the " Botanical Miscellany," and the " Journal of Botany" by the same author, of which it is a continuation, it is needless to say more than that it is a worthy " companion." It commenced twelve months since, and is intended to contain " such interesting botanical information as does not come within the prescribed limits of the Magazine ;" that is, Curtis's Botanical Magazine; and it can be procured either as a separate monthly periodical, or stitched up under the same cover with that work.

No. xiii. commences with " botanical information," from a part of which we learn that Mr George Gardener sailed on 20th of May last from Liverpool for Rio de Janeiro, with the intention of travelling in South America as a botanical collector. " The Organ Mountains, so rich in orchideous plants, will probably be the spot where he will commence his researches; but the chief field of investigation will not be fixed till his arrival in Brazil. Preference will be given to those parts of South America which have been the least explored, and the names of such botanists as intend taking collections of specimens from him at the moderate rate of L. 2 the hundred species, is already considerable, so that we have every reason to believe he will meet, in the fullest extent, with the encouragement to which his great enthusiasm so justly entitles him. The specimens ticketed in all the collections will be marked with corresponding numbers, which numbers will be referred to when the lists of the species come to be published; as they will be with all convenient speed. Mr Gardener, shortly before his departure, published " Musci Britannici," or pocket Herbarium of Species of British Mosses, containing a collection of from 200 to 250 species. A few copies remain still for sale in charge of Mr Murray, curator of the Glasgow Botanical Garden. —Synopsis of the Hemimerideæ, a tribe of the Scrophulariaceæ, by George Bentham.—Lacis ceratophylla, with a figure, (the Podostemum ceratophyllus of Michaux,) a very singular plant, growing and flowering under water, attached to the stones at the bottoms of the North American rivers. Dr Hooker, in his description of this plant, of which he has now for the first time received perfect specimens, remarks, the " spatha contains what is usually considered as a single flower, but which I am rather led to consider as two, a *male* and *female*, at the extremity of a peduncle, so short as to be mostly included within the ruptured spatha."—*Erythroxylon coca*, or coca shrub of Peru. A figure of the plant is given with a description, intended as a supplement to a paper from the travels of Dr Pöppig, relating to the uses, property, and mode of cultivation of the shrub, p. 161 of Vol. i.—A monograph of the North American species of Rhynchosporæ, by Asa Gray, M. D. from the Annals of the Lyc. of Nat. Hist. N. York.

No. xiv. continues and completes Mr Gray's Rhynchosporæ; 30 species are described.—On the Esculent Plants of Van Diemen's Land, taken from the Van Diemen Almanac for 1834 and 1835, published anonymously, but due to James Backhouse, Esq. A short but interesting paper, and we should like to see a little of something similar introduced into the provincial Almanacs of Britain, instead of the ridiculous tales with which they are so frequently concluded.—Pteris esculenta, bearing the place in the pastures of our P. aquilina, is one of the most abundant, commonly used by the natives, and nutritive from the quantity of arrow-root contained in its roots, which creep horizontally, and when luxuriant are about the thickness of a man's thumb.—Agaricus esculentus is abundant in the island, and considered identical with the species in Europe.—Contributions towards a Flora of South America, by Sir W. J. Hooker and G. A. W. Arnot, Esq. continued from Vol. i.—Observations on some new or little known genera and species of Scrophulariaceæ, by George Bentham, Esq.—Notice concerning the late Mr Drummond's collections, made chiefly in the southern and western parts of the United States, continued from Vol. i.

TRANSACTIONS AND PERIODICALS—*Foreign.*

Annales des Sciences Naturelles. Zoologie, MM. AUDOUIN et MILNE-EDWARDS. *Botanique,* MM. AD. BRONGNIART et GUILLEMIN, (From page 196.) Crochard & Co. Paris, Mars 1836. (Continued from p. 193.)

1. *Zoology.*

AUDOUIN, *Concernant des calculs trouvés dans les canaux biliares d'un Cerf-Volant femelle,* (Lucanus capreolus,) *adressé à l'Académie des Sciences, le 7 Décembre* 1835.—On dissecting a female of Lucanus capreolus, two little calculi were found by Dr Aubé, in the slender biliary vessels, attached to the alimentary canal. These vessels entomologists in general have agreed to consider as subservient to the secretion of bile, as indeed their name implies, but some peculiarities in their mode of insertion into the intestines, in various insects, had led some of the most distinguished comparative anatomists to doubt the truth of this theory, and to offer other conjectures relative to their functions. The calculi above-mentioned being sent to Audouin, he immediately perceived how they might be made to illustrate this question. One of them was carefully analyzed, and it was ascertained to be composed of *uric acid;*—hence it follows, that the biliary vessels are in fact urinary organs. However, says Audouin, I am not unwilling to admit, as Meckel had conjectured, that these vessels of insects are at the same time both urinary and hepatic, not forgetting that some physiologists have proved, by a series of experiments and ingenious inferences, that the bile is not indispensable or even adjuvant to the act of digestion. This point being granted, we may conceive that it is of little consequence whether the urino-biliary-vessels open behind the stomach, in some parts of the intestinal tube, or even immediately at the anus, as we find is the case. In a note appended to this letter, Audouin gives a succinct history of the opinions of previous anatomists relative to the functions of the vessels in question.——A continuation of the translation of BRANDT'S *Remarques sur les nerfs stomato-gastriques ou intestinaux, dans les animaux invertébrés.——Description d'empreintes de piedes d'Oiseaux dans le Grès rouge du Massachusets, par* E. HITCHCOCK. A translation from Silliman's American Journal of Science, of a peculiarly interesting paper to all geologists and zoologists.——BRANDT, *Conspectus sectionum, generum, sub-generum et specierum novorum, quæ in fasciculo primo Prodromi descriptionum animalium a Mertensio in orbis terrarum circumnavigatione observatorum reperiuntur.*——ANALYSE *des travaux Anatomiques, Physiologiques et Zoologiques présentés à l'Académie des Sciences pendant le mois de Mars* 1836. There is nothing in these notices of sufficient importance to call for an extract of them. At their conclusion there is announced a new edition of the "Règne Animal," preparing for publication, to be illustrated with numerous plates engraved with every care, and containing a figure of the typical animal of every genus; as well as plans of the anatomy of the ordinal and classical sections. In what material respects the work is to differ from the "Iconographie du Règne Animal" of M. Guerin does not appear very evident.

II.—*Botany.*

Anatomie d'une branche de Pinus Strobus, par M. LINK. A paper worthy of the distinguished reputation of its author, and which will enable the geologist to determine, with comparative facility, the true nature of those fossil woods, which have been supposed to be the remains of the Coniferæ of a former world. ——*Bougueria, novum Plantaginearum genus, auct.* J. DECAISNE. A genus between Plantago and Littorella, allied to the former in habit, to the latter in the structure of the capsule. The only known species *(B. nubicola)* was discovered by d'Orbigny in Bolivia, growing in fissures of porphyritic rocks on the snow mountains, called *las lagunas,* far overtopping the city *Potosi.*——*Recherches sur l'élévation de la température du spadice du Colocasia odora* (Caladium odorum,) *faites dans le jardin botanique d'Amsterdam, par.* G. VROLIK, et W. H. DE VRIESE.——KOCK'S *Description des Orobanches de la Flore d'Allemagne* is concluded in this number.——SPACH, *Hypericacearum monographiæ Fragmenta.* Native Hypericum elodes is found to have, as its peculiar habit might have led one to anticipate, sufficient differential characters to become the type of a new genus. It is the *Elodes palustris* of Spach, and no other species is known.——*Notice sur l'Ambrosia maritima Linne, par.* M. LEON DEFOUR.——*Bryologie d'Europe publiée en monographies, par* MM. BRUCH et SCHIMPER. A review of the first part of the French edition. The book is very highly lauded. The part published contains the *Buxbaumiacées* and the *Phascacées.* MM. Bruch and Schimper remark, that in the *Muscologia Britannica* the description of the *Phascum alternifolium* applies in part to the *Archidium phascoides,* a species very different, although it has been often confounded with the former. It is easy to avoid this error by comparing the sporules of these two mosses: they are very plate of Bruguière so faithful, that he could not render to science a better service than to copy the plate of the latter. After this time the same description was adopted by most zoologists in various countries of Europe, until M. Raspail, in his beautiful and elaborate essay in the fourth volume of the Memoires de la Societé d'Historie Naturelle, pointed out the errors of his predecessors, and showed that the polype of Alcyonella contains not less than forty-four tentacula: That the circle of tentacula is complete, surrounding the mouth, but depressed into a horse-shoe form, and not constituting an incomplete circle, as stated by Bruguière, Lamouroux and others. That the tentacula are linear, not terminated by a rounded button as represented by Bruguiére and Lamouroux, and sanctioned by Lamarck. The error respecting the button-like extremities of the tentacula appears to have arisen from the examination having been made with only moderate magnifying powers. If examined with a common pocket lens, of 1¼ inch or even ¾ inch focus, the tentacula appear to be terminated by a rounded knob. This, however, is merely an optical illusion, from the recurved state of the extremities of the tentacula. Their linear form throughout becomes immediately obvious on examining them with higher magnifying powers. For this purpose it is easy to detach an entire living polype, and examine it when expanded in a watch glass, with a lens of $\frac{1}{10}$ of an inch focus. Single tentacula may be detached and examined by still higher magnifying powers ($\frac{1}{30}$ of an inch) when the cilia upon their surface become distinctly visible.—T. P. Teale.

Sparus aurata, Jenyns's Brit. Vert. Anim. p. 353.—The description of this fish has been so mixed up with that of the *Pagellus centrodontus* by British ichthyologists, and it is apparently so very rare in our seas, that Mr Jenyns doubts whether it has really any claim at all to a place in our Fauna. I am able to remove this doubt satisfactorily, having in my possession a specimen of the fish, which was taken at the mouth of the Tweed in the month of May last. The fishermen inform me that they usually procure three or four specimens during the season. The one I have measures 18 inches in length, including the tail; and there is not the faintest appearance of the "longitudinal golden-coloured bands on the sides," so particularly mentioned by Mr Yarrell, and shown in his figure, but in other respects it agrees very well with the description.—G. J. Mr Yarrell's figure is taken from the work of Cuvier and Valenciennes.

Clupea alba.—The white bait has been observed by Dr Parnell in abundance in the Solway Frith, in June last. This is another Scotch locality for this little fish, and it is probable that its distribution will be found to be more extended than generally supposed, its small size being conducive to its concealment, except to the ichthyologist who examines the waters for himself.—R. P.

Cetonia aurata.—This fine insect, abundant in England, was observed in great numbers in one locality on the west coast of Galloway, by Dr Graham and Mr Scott in August last. The situation is close to the sea, and the spot in which the insect was found of very limited extent, and surrounded by precipitous rock. In every instance the insect was resting on the flowers of Angelica sylvestris. Eight specimens were taken, and are in the possession of Dr Greville.—R. K. G.

Bufo calamita.—This little toad is abundant on the shore of the Solway Frith, at Saturness point, Galloway. The principal locality is near the village of the same name, extending for half-a-mile on each side along the coast, which is there low and sandy, and covered with marine grasses. During the day it lurks beneath stones, forming a small cavity for the reception of its body, and towards the dusk of evening may be seen sallying forth from concealment in numbers along the beach, apparently in search of the insects which occur among the rejectamenta. They spawn gregariously in the pools of an adjacent marsh, or salt marsh, and at this period (about the end of June and commencement of July,) are extremely noisy, uttering in concert a continued croak. We are not aware that any other Scotch locality for this species has been recorded.—W. J.

Parasitic Larvæ.—M. Leon Dufour has presented to the Royal Academy of Sciences at Paris, an Essay on the Entozoæ and parasitic Larvæ peculiar to the Hymenoptera and Orthoptera, which contains some curious facts. The most remarkable regards a parasite in the Andrena aterrima. This larva establishes itself upon the large trachean vesicle, which may be observed at the base of the abdominal cavity. It is there fixed by means of two similar trachean tubes, which afterwards branch, or are ramified on its body, and this double trachea is evidently furnished by the large vesicle of which it is a continuation. We have thus two nutritive tubes dependent on the large air vesicle of the Andrena, which go to form the whole respiratory organ of the parasite, that is, the most essential apparatus for the maintenance of its existence, and the life of the larva is thus doubly dependent on that of the Andrena, which not only furnishes the quantity of air necessary for respiration, but it provides at the expense of its own substance the organs destined for the circulation of this vital fluid.—Inst. 1836. p. 214.

BOTANICAL INFORMATION.

Dr Graham's Excursion to examine the Botany of the Shores of Galloway in August 1836.—The party met by appointment at Stranraer on the morning of the 1st of August, and in their first walk crossed the peninsula separating Loch Ryan from the Irish channel at Lochnaw Castle. They then walked along the coast for a little way to the northward, recrossed the peninsula, and returned to Stranraer. They then passed by Stoneykirk to Sandhead, and along the shore by Drummore, round the Mull of Galloway to the station where last year Ononis reclinata was found to the northward of West Tarbet. Thence they returned along the southern shore to Glenluce, and passing by Port William, Glasserton, Burrowhead, Whitehorn, Whitehorn Isle, and Garlieston, reached Wigton, where the party broke up on the 9th of August. To this point the greater part of the coast was pretty carefully examined; also subsequently by Dr Graham in the neighbourhood of Kirkcudbright and Balmaehead.

The weather was extremely hot and dry during the whole time, with the exception of the 1st August, when there were a few slight showers; and of the 3d, on which a good deal of rain fell. No new plant was added to the British Flora; but Erodium maritimum, to the northward of Port William, and Jungermannia Mackaii, near Drummore, were for the first time observed to be natives of Scotland. Scirpus Savii was found in much larger quantity than last year. Bartsia viscosa, and Carum verticillatum, not observed last year, were gathered this, the former between Port William and Glasserton, the latter near Wigton, and between Gatehouse and Kirkcudbright. In many places along the coast, between Glasserton and Balmaehead, Genista tinctoria grows in great profusion;

and Artemisia maritima was found abundantly at Burrowhead, near Cragleton Castle, and at St Mary's Isle, more sparingly in a few other places between the first and second stations. The neighbourhood of Kirkcudbright is quoted as a Scotch station for Lathyrus latifolius. It was accordingly found abundantly in the woods at St Mary's Isle, but it is known certainly to have been introduced many years ago. Solanum nigrum, which is by no means a common plant in Scotland, and perhaps only occurs where introduced, was observed in dense masses growing in the neighbourhood of Sandhead, and to the northward of Port William, on three or four spots where sea-weed had formerly been laid up to dry.

The pools were examined on the whole route, and inquiry made everywhere for Cladium mariscus, but no trace of it was seen or heard of; and a suspicion necessarily arose regarding the correctness of a statement, that the plant is abundant in Galloway. Does it exist there at all? Has Galloway been inadvertently substituted for Galway? There it does grow.—R. G.

Calothrix distorta, Hook. Br. Flor. ii. 369.—This pretty and rather rare Algæ was found by Mr Selby and myself in Newham Lough, August 15, 1836. It is a new acquisition to the Flora of Northumberland.—G. J.

Jungermannia Mackaii.—This plant was observed growing on some rocks by the sea side near Drumore, Galloway, in the month of August last. It is a rare species, confined to the British Islands, and no Scottish station for it has been hitherto placed on record.—R. K. G.

The genus Rubus.—In Koch's *Synopsis Floræ Germanicæ et Helvetiæ*, recently published, the species of this most difficult genus are reduced to five, viz. *R. Idæus*, *fruticosus*, *cæsius*, *saxatilis*, and *chamæmorus*. The number of species in the *British Flora* is thirteen. The German and Swiss roses are all referred by Koch to seventeen species.—R. K. G.

The genus Adoxa.—This plant, referred by some botanists to *Saxifrageæ*, by others to *Araliaceæ*, is placed by Koch among the *Caprifoliaceæ*. He observes that it is closely allied to *Sambucus* in the parts of fructification.—R. K. G.

A list of Mosses, Lichens, and Algæ of the "Flora Hibernica," not hitherto described as British.

I. Musci.

1. Gymnostomum tortile, *Schwaegr.*
2. Glyphomitrion cylindraceum, *Taylor.*

II. Hepaticæ.

3. Jungermannia calycina, *Taylor.*
4. Jungermannia microscopica, *Taylor.*

III. Lichenes.

5. Bæomyces microcephalus, *Taylor.*
6. Verrucaria conferta, *Ibid.*
7. ———— byssacea, *Ach.*
8. ———— immersa, *Hoffm.*
9. ———— viridula, *Ach.*
10. ———— lithina, *Ach.*
11. Verrucaria lucens, *Taylor.*
12. ———— rubiginosa, *Ibid.*
13. ———— irrigua, *Ibid.*
14. ———— fissa, *Ibid.*
15. ———— gemmifera, *Ibid.*
16. ———— circumscripta, *Ibid.*

17. Verrucaria peripherica, *Taylor.*
18. ————umbrosa, *Ibid.*
19. ————mollis, *Ibid.*
20. ————erysiboda, *Ibid.*
21. Endocarpon rufo-virescens, *Ibid.*
22. ———— sulphureum, *Ibid.*
23. ———— macrocarpa, *Ibid.*
24. ———— rugosum, *Ibid.*
25. Porina fallax, *Ach.*
26. Syncesia albida, *Taylor.*
27. Arthonia ilicina, *Ibid.*
28. Opegrapha sulcata, *Pers.*
29. ————saxigena, *Taylor.*
30. Collema cristatum, *Hoffm.*
31. ——— synalissum, *Ach.*
32. ——— glomerulosum, *Ach.*
33. ——— fragile, *Taylor.*
34. Variolaria constellata, *Ibid.*
35. ———— corallina, *Ach.*
36. ———— polythecia. *Taylor.*
37. ———— torta, *Ibid.*
38. ———— chlorothecia, *Ibid.*
39. ———— terricola, *Ibid.*
40. Lecidea macula, *Ibid.*
41. ——— melastigma, *Ibid.*
42. Lecidea fumosa, *Ach.*
43. ——— recedens, *Taylor.*
44. ——— stellulata, *Ibid.*
45. ——— premnea, *Ach.*
46. ——— scabra, *Taylor.*
47. ——— pulvinata, *Ibid.*
48. ——— Templetoni, *Ibid.*
49. ——— geomæa, *Ach.*
50. ——— lapidicola, *Taylor.*
51. ——— picta, *Ibid.*
52. ——— fuliginosa, *Ibid.*
53. ——— latens, *Ibid.*
54. Lecanora multipuncta, *Ach.*
55. ———— involuta, *Taylor.*
56. ———— varia, *Ach.*
57. ———— minuta, *Ach.*
58. ———— albo-flavida, *Taylor.*
59. ———— linearis, *Ibid.*
60. Parmelia horrescens, *Ibid.*
61. ————columnaris, *Ibid.*
62. ————sulcata, *Ibid.*
63. ————rugosa, *Ibid.*
64. ————adglutinata, *Flœrke.*
65. ———— reticulata, *Taylor.*
66. Sticta ciliata, *Ibid.*

IV. ALGÆ.

67. Sporachnus Cabzeræ, *Ag.*
68. Polysiphonia thuyoides, *Harv.*
69. ———— cristata, *Ibid.*
70. Griffithsia simplicifolium, *Ag.*
71. Conferva nuda, *Harv.*

MISCELLANEOUS INFORMATION.

Sixth Meeting of the British Association for the Advancement of Science.

President,—Professor Henslow.

Vice-Presidents,—Rev. F. W. Hope, Dr J. Richardson, Professor Royle.

Secretaries,—John Curtis, Esq.; Professor Don; Dr Riley; S. Rootsey, Esq.

Committee,—W. Yarrell, Esq.; Rev. L. Jenyns; T. Mackay, Esq.; C. C. Babington, Esq.; Professor Nilsson (*of Lund.*); Hon. Ch. Harris; Rev. —— Phelps; Richard Taylor, Esq.; T. C. Eyton, Esq.; J. E. Bowman, Esq.; W. C. Hewitson, Esq.; Dr Scouler; Dr Jacob; Rev. —— Ellocombe; G. J. Jeffrys, Esq.; R. M. Ball, Esq.; Colonel Sykes; J. L. Knapp, Esq.; N. A. Vigors, Esq.; E. Forster, Esq.

The proceedings of this Section were continued during Monday, Tuesday, Wednesday, and Thursday. On Friday the members separated for the purpose of making various excursions, to explore the Natural History of the neighbourhood. Much interesting matter was brought forward and discussed, of which we cannot pretend to give a very minute detail. Dr Richardson's Report on the Zoology of North America was prepared at the request of the Association, and will be printed at full length in their Transactions for the current year. We cannot here do more than give a very brief summary of the principal facts detailed, without making any reference to the authorities to whom the Doctor referred, but which will of course be mentioned in the report This report was read in three portions, on three separate mornings, but we prefer giving the whole of it together, as though it had occupied only one sitting. With this exception, the proceedings of the Section will be referred to the several days on which they took place.

Monday, August 22d.—Dr Richardson's Report.

Notwithstanding the ravages which have taken place among the various tribes of animals in North America, as the progress of civilization has advanced from east to west, it is still highly probable that no single species has yet become extinct, and the colonist has still the means within his reach of studying the habits of every indigenous animal. As the genera of European and North American animals are for the most part the same, whilst a very great dissimilarity subsists between the species peculiar to the two continents, this affords considerable facility for promoting inquiries into the geographic distribution of particular types of animals. The observations of Dr Richardson in this report were confined to the distribution of the Mammalia and Aves; and chiefly those which were inhabitants of the western parts of North America, including New Mexico, the Peninsula of Florida and California, down to the well-defined limits of the South American zoological province. Dr Richardson then entered at considerable length into the description of the physical structure of the country under consideration, pointing out the more direct means of communication by transverse valleys, the course of streams, or extensive prairie lands, along which the quadrupeds, birds, or fish of distinct parts were enabled to perform their respective migrations; and he stated the great probability of a more complete interchange of the fish one day occurring, so soon as the several canals already projected, or in progress, should be completed. The eastern coast, at least in the more northern latitudes, has a decidedly lower mean temperature than the western, or than that of the eastern parts of Europe under the same parallels of latitude. In consequence of this, the migration of the birds is here more general than under the same parallels in Europe. Dr Richardson then entered upon several details connected with the subject of temperature.

Geographic Distribution of the Mammalia.—Although there exists a great general similarity between the Mammalia of Europe and North America, these latter are widely different from those of the southern Fauna of the new world. The line of demarcation between these zoological provinces does not occur at the Isthmus of Darien, but at the tropic of Cancer. Dr Richardson then detailed the particular results of his inquiries under the several orders of this class, from which we cull the following remarks as among the most interesting.

Quadrumana.—Although one species of this order is found in Europe as far north as latitude 36°, none occur in America to the north of the Isthmus of Darien.

Carnivora.—The sixteen bats of North America are peculiar, but in all probability there are many more to be discovered. Only two of them have been yet traced over any great extent of country.

There are ten species of Insectivora, and in this family the North American Mammalia differ more from the European than in any other of the Carnivora. There are three European genera, which do not exist in North America, and the only three genera found in North America are not met with in South America. The species of North American Sorex very closely resemble those of Europe.

The Marsupiata, so eminently characteristic of New Holland, and also abundant in South America, have only three representatives in North America; and two of these reach no higher than Mexico; but the Virginian opossum ranges from Paraguay to the great Canadian lakes.

The family Carnivora contains about forty species, many of which are also met with in Europe, unless a closer examination shall hereafter enable naturalists to distinguish some of those which are now considered to be identical. With the exception of a very few genera belonging to the South American group the rest are all common to Europe also.

In the Plantigrada, there are four bears, two of which are peculiar to the new world, one of them ranging farther to the north than any other quadruped. Cuvier considers the wolverine as identical with that of Europe. The Mustelæ do not range farther to the South than the northern or middle provinces of the United States. It is very uncertain whether any of this genus are identical with those of Europe. There are three otters, and one of them seems to be identical with our own, whilst the Lutra Brasiliensis, if truly North American, is equally an inhabitant of the Arctic sea, and a great part of South America. Eight species of Canis have been described, but there is great difficulty in discriminating them, as well as in identifying any of them with those of Europe. There are also eight species of Felis, some of which, however, are uncertain, and three range from South America into the South Western States. There are nine species of Amphibia, which mostly range through the northern seas of both the old and new worlds. The genus Otaria is peculiar to the North Pacific, but is found on the Asiatic coast, as well as on that of North West America.

Rodentia.—This order is eminently characteristic of North America, which contains more species, and a greater variety of distinct forms than any other part of the world. Between seventy and eighty are already known. The squirrels are as yet very imperfectly determined. The marmots are abundant, and only one of them is probably common to Europe. There is one only of the restricted genus Mus, which is certainly indigenous, and this closely resembles our M. sylvestris.

Edentata.—The fossil Megatherium and Megalonyx are dispersed through both the continents of America, but only three or four living species of this order belong to North America. The order itself is peculiarly characteristic of South American zoology.

Pachydermata.—This order is rich in fossil species, which in America are more than twice as numerous as those now living, and these do not amount to more than three or four species, and are found both in North and South America. Fossil bones of the horse occur at Kotzebue's Sound, though the present race of this quadruped has been undoubtedly imported. Remains of fossil elephants and mastodons are met with in the most northern regions.

Ruminantia.—Of thirteen species of this order already ascertained to inhabit North America, two are common to Europe, and have a high range. The deer are very imperfectly determined; but the rein-deer proceeds south, as far as Columbia river on the west, and New Brunswick on the east. The musk-ox, so abundant in the north, is not found either in Greenland or Asia.

Cetacea.—Some of these, as the seals, are very imperfectly determined.

Most of the species on the east coast appear to be common to Europe, those on the west are also found in Asia. About nine in all have been described as North American.

Aves.—Dr Richardson professed not to enter very fully into details respecting the different orders of birds, as the species were generally much more known than those of the Mammalia. Many of them being migratory, quitted the less accessible countries at stated periods of the year, and in passing through those tracts which were comparatively civilized, afforded the naturalist an opportunity of studying their habits. Their geographical distribution was still very imperfectly known, from the want of local lists, more especially in California and Russian America. About 500 species were now described, nearly one-fourth of which were common to Europe, and about one-eighth to South America. Of those common to North America and Europe, there were 39 land-birds, 28 waders, and 62 water-fowl. Several genera were confined to North America, but only two families, the Trochilidæ and Psittacidæ, were absent from Europe. The birds of prey in general have an extensive range, some of the North American species being found in the most distant parts of the world, others extend through South America, nearly half of them are common to Europe, if we except the vultures, of which those in the new world are peculiar to that country. Except the Corvidæ, of which one-fourth are also common to Europe, the rest of the North American land birds are for the most part restricted to that country, and two only out of the 62 Sylviadæ are found in Europe. Twenty-two species of Trochilus are described as natives of Mexico, but not one of the North American species has been met with in South America, although the family to which they belong is peculiarly characteristic of the ornithology of that country. In accounting for the causes which determined the migration of North American birds, Dr Richardson considered the spring movement intended for the purpose of finding suitable spots for breeding. The chief lines of route, he described as being mainly determined by the greater or less facility experienced in procuring food, from which circumstance the flights northwards and southwards often extended over very different lines of country. The physical structure of North America was also effective in determining three particular courses, along which these migrations occurred. The progress of civilization has already produced a decided effect in the migrations of some species, causing the starlings, for instance, to proceed further northward, as they are now secure of finding a provision in the corn-fields, where formerly they would have obtained no food. A table was then explained, in which were exhibited the total number of species hitherto known, with references to those which breed in Philadelphia, Massachusetts, and Suskatchewan. He considered America to afford remarkable facilities for tracing the course of the different tribes in their migrations, and concluded his report by a notice of certain *desiderata* to our knowledge of North American zoology, which will be printed apart in the forthcoming volume of the Reports of the Association.

Mr Rootsey exhibited a living specimen of a large spider, which had been accidentally imported in a freight of logwood from the Bay of Campeachy. He supposed it to be the Aranea avicularia, *Linn.* Mygale avicularia of modern authors. But Mr Hope expressed his opinion that it was not this insect, but a closely allied species described by Spix and Martius. He stated, however, that he had seen the true Mygale avicularia alive in England, washed ashore from a wreck on the coast of Essex.

Mr Rootsey gave a detailed account of his experiments upon the root of Mangel-Wurtzel, made for the purpose of ascertaining the probability of its being successfully employed in this country for the manufacture of sugar. He exhibited specimens of this sugar of good quality, and considered that a judicious selection of the soil in which the mangel-wurtzel was to be grown might certainly render it an advantageous speculation. His opinion was founded upon the uses to which the refuse of this plant might be applied, after extracting of the juice from which the sugar had been obtained. Of this refuse an excellent kind of malt might be prepared, from which he had brewed good beer, and extracted an ardent spirit. It was also found serviceable for fattening cattle. He stated, contrary to the received opinion, that this plant was liable to the attacks of insects, as he had found it infested by the Haltica nemorum.

Mr G. Webb Hall, as a practical agriculturist, entirely differed from Mr Rootsey in supposing that the mangel-wurtzel might be grown to advantage for the purpose of making sugar.

Professor Henslow exhibited some crystals of white sugar-candy, obtained from the flowers of Rhododendron Ponticum. A detailed account of these has since appeared in Loudon's Magazine of Natural History for September 1836.

Mr G. Webb Hall read a paper "on the Acceleration of the Growth of Wheat." By a judicious selection of seed, and a proper choice of situation, Mr Hall had been able to procure a ripe crop in the middle of August from seed sown early in March. Dr Richardson referred to a remark of Humboldt, that the American crops generally were ripened in ninety days from the period when they were sown; and suggested the propriety of procuring seed from Hudson's Bay, where he had found the crop to ripen in seventy days.

A mode of accelerating the germination of seeds was noticed by Professor Henslow, who stated, that he had produced this effect by boiling the seeds of a Cape Acacia. The details of this experiment are given in Loudon's Magazine of Natural History for September 1836. Mr Hope referred to a custom in Spain of partially roasting the corn before sowing it, for the purpose of destroying an insect by which it was infested.

Dr Daubeny stated, that he had commenced a series of experiments for the purpose of ascertaining the effects produced by arsenic on vegetation. He had been informed that nothing but a few Leguminosæ would grow in a particular district of Cornwall, where the soil contained about 50 per cent. of the sulphuret of arsenic, and the rest of which was chiefly sulphuret of iron and silica. He had ascertained that a little of the sulphuret of arsenic produced no effect on vegetation, probably from its not being very soluble, though it was certainly taken up in a certain proportion. He had also ascertained that plants would bear being watered with a solution of arsenious acid, in much greater proportion than was hitherto considered possible, without injuring them.

Tuesday, August 23d.—Dr Richardson's Report continued.

Mr Bowman read a communication on the Longevity of the Yew Tree. He had examined several young trees whose precise ages were known, and had ascertained that their average rate of increase for the first 120 years was at least two lines, or the sixth of an inch per annum. He then proceeded to give his mode of estimating the ages of two very large trees, from the trunks of which he had procured small fragments, for the purpose of ascertaining the rate at which they were now forming their layers. One of these is in the churchyard of Gresford, near Wrexham, North Wales. Its trunk is 22 feet in circumference at the base, and 29 feet just below its branches. It appeared from three sections that it had formed on the average 34¾ rings in one inch of the latest formed wood, and he concluded that this tree might be considered at 1419 years old.

The second tree is in the churchyard of Darley in the Dale, Derbyshire; and its mean diameter from measurements at four places is 1356 lines. From sections made on the north and south sides, he found that the new wood averaged 44 rings in an inch, and he concluded that this tree might be considered as 2006 years old. He accounted for these very old trees being met with in churchyards, by supposing them to have marked the sites of places consecrated to the dead, or devoted to some religious ceremony prior to the introduction of Christianity.

Professor Henslow differed from Mr Bowman, in his opinion that De Candolle's rule underrated the ages of these trees, and referred him to the reasons which he had already published in his Principles of Botany, for supposing that De Candolle's estimate made them at least one-third older than they really were.

Mr Ball exhibited some skulls of a species of Irish seal, which he considered to be hitherto undescribed as a native of Britain, and very distinct from the two already known. Whilst the Phoca vitulina was readily tameable, this species was never known to have been tamed.

Professor Nilsson of Lund immediately recognized these specimens as belonging to a distinct genus from Phoca, and which he had described by the name of *Haliochœrus griseus*. It is common in the Baltic and North Sea, and occurs in Iceland, and when full-grown is eight feet long. He remarked that the *Phoca vitulina* of Linnæus contained three species, and one of these, not hitherto recorded as British (the *Ph. annellata,)* he had seen in the Bristol Institution, and which had been captured in the Severn.

Dr Riley exhibited the stomach of this last mentioned individual, in which he had found between thirty and forty pebbles, and stated it to be a vulgar notion that these were of service to the animal in some way, by enabling it to catch its prey with greater facility. Neither Sir Francis Mackenzie, Professor Nilsson, or Mr Ball, each of whom had frequently dissected seals, had ever noticed the occurrence of pebbles in their stomachs.

Dr Hancock described a new species of *Norantea*, which he had long considered to be identical with the *N. Guianensis*, but which he was now satisfied was distinct. Aublet's plant is described as a tree 80 feet high, but the present species is a large climber.

Mr Hope exhibited an hermaphrodite specimen of *Lucanus camelus* from North America, in which the right side of the head was formed with a projecting maxilla like the male, and the left with a contracted one like the female. A similar monstrosity has occurred in the European *Lucanus cervus*.

Mr Yarrell remarked, during a discussion which took place after the exhibition of this specimen, that he had found both male and female organs to be present on opposite sides of hermaphrodites among lobsters and birds which he had dissected; and he had met with a fish having hard roe on one side, and soft on the other. He then alluded to some singular facts which he had noticed in an hermaphrodite fowl, and which he proposed soon to make public.

Mr Hope read a paper "on the probability that certain Opinions of the Ancients were derived from their observations upon Insects," in which he particularly noticed the apparently spontaneous generation of many of these from the mud of the Nile, and the metamorphoses which others must have been observed to undergo. From hence he considered that they had derived their notions of the vivifying influence of the sun, and their doctrine of the metempsychosis.

Mr G. Webb Hall made some remarks upon the value of lime as a manure; and stated, that he had found by experience the advantage of employing it fresh from the kiln, and ploughing it into the ground within twelve hours of the time when it was first scattered over the surface.

Wednesday, 24th August.

Col. Sykes laid before the Section a manuscript volume containing an account of the fruits of the Deccan, which he had compiled during an extensive and minute statistical inquiry undertaken by him when in India. Most of the species enumerated were accompanied by accurately coloured drawings prepared by a draughtsman in his service, and each was furnished with a scale taken from actual measurement. His manuscript contained also the opinions of the Hindoos respecting the various medical and other properties of most of these fruits; and these he had compiled from five very ancient works obtained by him in the country, and written in Sanscrit. Col. Sykes then selected some of the more interesting species, both of the wild and cultivated fruits, upon which he commented, mentioning such peculiarities as he considered most worthy the attention of the Section. Of these, the golden plantain was remarkable for bearing fruit only once, and was a tree of great beauty. A plant, which he considered might be looked upon as the origin of the whole Citrus family, was abundant in a wild state over the western parts, and became a good sized tree. Near the source of the river Becara, he had found the wild nutmeg, also assuming the character of a large forest tree. A species of mulberry was noticed which he considered new. The Anona, Anacardium, and Carica are universally cultivated, though supposed to be natives of the new world.

Mr Mackay read a short report which he was requested last year to prepare, "on the Geographical Distribution of the Plants of Ireland." He enumerated such species as were common to the neighbourhood of Dublin, Edinburgh, and the south coast of Scotland, and selected 195 of the more remarkable species by which to illustrate his subject. The more southerly position of Ireland, and the comparatively lower elevation of its mountains, deprived this country of many species, chiefly alpine, which Scotland possessed, and of these Mr Mackay enumerated not less than 55. Many natives of the west coast are not found in Scotland, but belong equally to the mountains of Spain and Portugal. A list of 21 species was given of plants indigenous to Ireland, but not hitherto met with in any other part of Great Britain. Mr Mackay considered that he had not satisfactorily completed his researches on this subject, but proposed to give the Section an enlarged report on some future occasion.

Professor Royle then read a paper "on the Properties of Caoutchouc, and the various plants from which it was possible to obtain it." He had learnt from the proprietor of an extensive manufacture of this substance, that there were great difficulties in the way of obtaining it in a pure state, especially that which came from the East Indies, where Professor Royle knew that any quantity might be obtained from a great variety of plants, if the natives could be prevailed upon to use the precautions requisite for procuring a superior article. The South American caoutchouc was much superior in value from this circumstance alone, since that from the east was of equally excellent quality. At present, that from Para sells at 2s. 6d. or 3s. per pound, whilst the East Indian fetches only 2d., and can be used merely for the purposes of distillation, in manufacturing the caoutchoucine. The material was now obtained, or could be obtained from many countries of the east, and by further research it would most likely be found to exist in several other species than those in the same families from which it was now procured. These families were stated to be Cichoraceæ, Lobeliaceæ, Apocyneæ, Asclepiadeæ, Euphorbiaceæ, Artocarpeæ. Professor Royle had remarked that bird-lime was often made from plants producing caoutchouc, and that these had their woody fibre particularly strong and tenacious. Coupling this fact with the circumstance of the silkworm feeding on the same or similar plants, he feels inclined to believe that caoutchouc may form an essential ingredient in their food. He had procured an analysis to be made of the juices of the mulberry, and found them to contain caoutchouc.

Mr P. Duncan proposed a query, which was not fully answered, whether the animalcules which produce the luminosity of the sea, ever emit their light under water, or without first coming to the surface?

Dr Hancock read a paper on a species of cow-fish closely allied to the Manatus fluviatilis, but which he considered to be distinct. He had noticed it in the interior of Guiana, but it is now rarely to be met with any where near the European colonists. The species grows nearly to the length of nine feet, and weighs about 800 lb. He thought this animal might be easily domesticated. Dr Riley thought it doubtful whether the animal described by Dr Hancock might not be a dugong; and noticed an error in Cuvier, who asserted the Manatus Americanus to have only thirty-two teeth, whereas he now exhibited a skull of this species in which thirty-six might be observed, or rather the places which they occupied; for it always happened that the anterior molars were shed when the posterior were being protruded. The places of two incisors were certainly to be found in the upper jaw, and probably there had also been two in the lower.

Dr Macartney explained his method of preserving animal and vegetable substances from the attacks of insects and other sources of decay. For this purpose he used a concentrated solution of equal parts of alum, nitre, and salt, mixed with an equal proportion of proof spirits of wine, to which a little essential oil, either rosemary or lavender, had been added. He recommended also the use of pyroligneous acid, and then a coat of plaster of Paris, which might afterwards be removed when the object was thoroughly dry.

A collection of beautifully preserved specimens of North American insects, procured by some persons in Bristol, was exhibited by Mr Hope. These insects were imported in casks of raw turpentine, and when this was dissolved, they floated to the surface, whence they were taken, and after being immersed in spirits of turpentine, to remove the turpentine with which they were encrusted, they were set out in the way which is usually pursued by entomologists.

Thursday, 25th August.—Dr Richardson's Report concluded.

A communication from Dr Moore, stated that he had taken the *Trigla cataphractes* in Plymouth harbour, and which was the first time this fish had occurred in Great Britain. Mr Carpenter read an abstract of Dr Pritchard's views contained in his "Physiology of Man," respecting the proper criterion upon which zoological and botanical species should be founded. He considered that science had now attained to that state in which it had become evident that a discrimination of species could not repose upon external characters alone, and ought to be coupled with certain characteristics, which could not be entirely obliterated or altered by the influence of external causes. He more particularly specified four heads, under which many circumstances might be arranged, as auxiliary means for the determination of specific differences. 1*st*, Such as regarded the several vital functions, because there were minute differences of structure which could only be understood to exist by observing a difference in the results produced by the same functions in different individuals. 2*d*, Hybridity. Dr Pritchard considered that true hybrids could only be rendered fertile by mixing with the parent breed. 3*d*, He thought it possible that pathological considerations might be employed, and instanced the operations of morbid poisons. 4*th*, The instincts, habits, and what might be called the psychical endowments of particular animals. The abstract given by Mr Carpenter was intended to promote a discussion on a subject already treated of by Dr Pritchard, and for which we may refer to his work.

Mr P. Duncan thought that instinct and habit were of great service in settling specific distinctions, and noticed particularly the difference in nidification between certain species of birds which very closely allied.

Mr Eyton mentioned having obtained fertile hybrids between a common gander and the Anas cygnoides. Also between the Chinese boar and a common pig. Mr Vigors was inclined to take Hunter's view of the non-fertility of true hybrids, and thought that many supposed exceptions had originated in a want of proper caution in performing the experiments. He thought with Dr Pritchard, that the diseases of different animals might be taken as one means of discriminating species, and he considered it possible to make use of the distinctions between the parasitic animals which infested them. Dr Riley differed from Dr Pritchard, and considered his views as too metaphysical, and thought it would one day be found necessary to abolish the notions of species altogether.

Mr Yarrell believed it to be nearly a universal law that hybrids were barren. It was unquestionably the case with the common mule, as had been often proved on the continent, where this animal was largely bred. But he mentioned an instance where fertile hybrids were produced between *Anas boschas and acuta.*

Rev. Mr Phelps read a paper "on the Formation of Peat," particularly describing some peat tracts south of the Mendip hills. So long as this tract had continued to be well drained, whilst it belonged to the abbots of Glastonbury, it afforded a very rich pasture land. After the monastery was suppressed, it became crown-land, and was neglected, and soon returned to the state of a peat bog. It had been subsequently reclaimed a second time, and Mr Phelps's researches had enabled him to find trees which had flourished during the period it was under the power of the abbots, and which had been imbedded in the subsequent formation of the peat; as well as many other objects of interest, and among these were some Roman remains which he had obtained at a depth of twelve feet.

Mr Mackay, after exhibiting some specimens of Scotch pine which he had procured from peat bogs in Ireland, proceeded to read a communication from Mr Nuttall "on the Management of the Pine Tribe," in which he stated having lopped some larches down to a strong lateral branch, and these had nevertheless become fine trees; and Mr Mackay noticed an instance of a similar kind, where some plants of Pinus Canariensis, which he had grown from seed, after being cut to the ground by a severe frost, had thrown up shoots from the stools.

Mr Forbes communicated the names and localities of sixteen species of shells new to Scotland, and had observed that many species, which on the east coast and in the Irish sea, were found only in very deep water, occurred above low water mark on the west coast.

Dr Lloyd read a paper on the Marsiliaceæ. He confined his observations more particularly to the *Pilularia globulifera*, and considered the two kinds of grains found in the involucrum as respectively analogous to pollen and seed. In causing the seed to germinate he had observed that the first appearance of the leaf always took place at a determinate spot. There are no spiral vessels, but only a bundle of minute ducts in the centre of the stem and leaves.

An abstract of a paper by Mr P. Teale was read on the "Alcyonella stagnorum," and several specimens in beautiful preservation were exhibited. This animal was found near Leeds in 1835.

Mr Yates exhibited several specimens of the insect called a "vegetating wasp," which he had received from Jamaica. It appeared to be a Polystrix, according to Mr Hope, and to be incrusted by a remarkable fungus allied to *sphæria*, which, it was asserted, attached itself to the body of the living insect.

Dr Riley exhibited a skeleton of the two-toed ostrich, in which he pointed out the fact, hitherto unnoticed, of there being in reality a third toe in a rudimentary state, consisting of two phalanges, and articulated to a well-defined condyle. Mr Bowman exhibited a specimen of *Spiræa hypericæfolia* gathered near Denbigh, where it has become naturalized.

Dr Tyacke exhibited specimens of *Lamium intermedium* from near Edinburgh and several parts of the Hebrides.

Dr Corbet sent a communication illustrated with dried specimens and drawings, shewing the effects produced by causing plants to absorb first the prussiate of potash, and then the sulphuret of iron.—J. S. H.

NOTICES OF PROCEEDINGS OF SOCIETIES.—LONDON.

MEDICO-BOTANICAL SOCIETY, May 25, 1836. (Continued from p. 208.)—Dr Ryan in the Chair. A communication by Mr Alsop, on a new mode of making and preserving infusions, was read. The alteration in the mode of preparation consisted principally of a perforated plate inside the infusion jar, resting on a ledge, on which the material to be infused was placed. The boiling water is then poured on, and as it becomes saturated, sinks through the perforations, fresh liquid supplying its place, as long as there is any thing left which water can dissolve. It is to be preserved by bottling it hot in well-stoppered vessels, filled completely, so as entirely to exclude the atmospheric air. In this way, Mr Alsop preserved an infusion for nine months.

A paper by Colonel Galindo, the envoy from Guatimala, was next read, giving a list of the medicinal plants of that country. After which Mr Foote read an essay on the use of the oil of turpentine in the treatment of inflammation of the iris. In accordance with the views of Mr H. Carmichael of Dublin, he recommends its employment in those cases only, where, from previous free use of mercury, or from idiosyncrasy, that powerful remedial agent cannot be had recourse to. Several cases were detailed in proof of its efficacy. Mr Foote considers it acts as a counter-irritant on the alimentary canal.—*Communicated by Mr Foote, one of the Secretaries.*

PROVINCIAL.

TWEEDSIDE PHYSICAL AND ANTIQUARIAN SOCIETY.—This society, established at Kelso in the year 1834, has for its principal object the study of the natural history and antiquities of the district traversed by the Tweed and its tributary streams. The members are engaged in establishing a museum, in which are to be preserved specimens illustrative of those branches of science; all expenditure of the society's funds being restricted to such objects as belong to the locality to which its attention is chiefly directed, though the reception of *donations* of other specimens and curiosities generally is not considered as excluded by the society's plan. Among its present acquisitions is a Herbarium, containing by far the greater portion of the plants occurring in the district, and upon which was founded the Berwick Flora of Dr Johnston; besides a collection of upwards of 400 specimens of grasses and other plants, distinguished for their economical uses or their connection with agriculture. The collection of native birds, which is daily on the increase, amounts at present to about 200 in number, and includes several which are rarely met with in the locality, such as the Falco peregrinus, F. æsalon, Caprimulgus Europeus, Lanius excubitor, Bombycilla garrula, Loxia curvirostra, Picus major, Anas glacialis, A. ferina, A. acuta, Anser bernicla, Mergus albellus, &c. Some of the most interesting of the native quadrupeds have been preserved, and there is a small collection of shells, with a moderately extensive one of minerals and fossils. The museum also possesses a few valuable books relating to the sciences, the study of which it is intended to promote; the nucleus of a collection of British coins; and various curiosities and antiquities, both general and local. It is supported chiefly by donations, and by a small annual subscription of 10s. 6d. from each member. The members are 84 in number, and may be classed as follows: nobility and gentry, 33; clerical, 8; medical, 8; legal, 8; mercantile and agricultural, 27. Sir Thomas Makdougal Brisbane of Makerstoun, K. C. B., &c. is the president for the current year. The general meetings take place once a quarter, at which essays and communications are received and read; and the museum is open for gratuitous inspection thrice a week. A new building will probably be provided at no distant period, to be specially appropriated to the purposes of the society, a portion of the requisite funds having already been contributed.——His Grace the Duke of Roxburghe has been engaged for two or three years past, in the formation of a collection of British birds at his seat of Fleurs, Roxburghshire. The specimens, male and female, amount at present to nearly 400 in number, and include some of considerable rarity, either as residents or as regular or occasional visitants. Amongst them are *(Accipitres)* Strix bubo, S. scops, S. nyctea, S. passerina, Falco Islandicus, Pernis apivorus, &c.; *(Rassores)* Cypselus alpinus, Pastor roseus, Oriolus galbula, Upupa epops, Merops apiaster; *(Scansores)* Picus martius, Yunx torquilla, Nucifraga caryocatactes, Coracias garrula; *(Grallæ)* Ardea egretta, A. nycticorax, A. minuta, Recurvirostra avocetta, Ibis falcinellus, Tringa pugnax, Oidicnemus crepitans, Otis tarda, Himantopus melanopterus, Scolopax major; *(Palmipedes)* Anas spectabilis, Cygnus ferus, Colymbus glacialis, (killed near Fleurs,) Anser erythropus, &c. The museum is tastefully and judiciously fitted up, and the specimens are of the most perfect plumage, and in excellent preservation.

Natural History Society, Belfast—The eighth public meeting of the Society was held in the museum on the 25th May, when the annual report of the council was read. The prospects of this Society are advancing; a debt of L. 800, with which it has been encumbered, has been nearly cleared off. The number of members are increasing, and considerable additions have been made during the past year to the museum and library. The zoological and botanical papers during the last session read were, "On the various contrivances for diffusing seeds observable in cryptogamic plants," by the president—"On the insects mentioned in Shakspeare's Plays," by Mr Paterson;—"On some proofs of design observable in the animal kingdom," by Dr Thomas Henry Purdon. The season was closed by an address from Mr James M'Adam reviewing the recent progress of science in Belfast.—The officers and council for the ensuing year, are

James L. Drummond, M. D. President—Rev. Dr Hincks, M. R. I. A. Hon. V.-P.
William Thomson, George C. Hyndman, V.-Presidents.
Jas. M'Adam, Corresponding Secretary.
John Grattan, Librarian.
R. S. M'Adam, J. D. Marshall, M. D. Recording Secretaries.
William Web, Treasurer.

Thomas Andrews, M. D.
James Bryce, Jun. A. M. F. G. S.
Edmund Getty.
Robert Patterson.
William Patterson.
James Sanders, M. D.
Rev. Isaiah Steen.
Professor Stevelly.

OBITUARY.

We announce with much regret the death of Mr Edward Turner Bennet, Secretary to the Zoological Society, who died on Sunday, 21st August, after a short illness. By his decease the Society has lost one of its most efficient office-bearers, and one whose province it was to detail the interesting additions which were acquired to the Mammalia of the collection. In this department he ranked deservedly high; perhaps, so far as Britain is concerned, higher than any one. This will be borne out by the papers he has published in the Transactions of the Zoological Society,—a work, of which he took the principal superintendence, and which for general execution, stands unrivalled. He is also known as the author of the Tower Menagerie, and the Gardens and Menagerie of the Zoological Society. His name will stand recorded by the Antelope Bennetii, Orthotomus Bennetii, &c. &c.

EDINBURGH:
PRINTED BY JOHN STARK,
OLD ASSEMBLY CLOSE.

MAGAZINE

OF

ZOOLOGY AND BOTANY.

ORIGINAL COMMUNICATIONS.

I.—*The Natural History of the British Entomostraca.* By WILLIAM BAIRD, Surgeon. Plates VIII. IX. X. *(Continued from p. 41.)*

IN my former paper, I gave a short general history of the "Entomostraca,"—a brief account of the authors who have noticed them particularly; and some general observations on their habits and manners. I also mentioned some of the various systematic arrangements which have been adopted by different authors, and stated the uncertainty which still exists as to their proper arrangement in a general system. In particular I described the arrangements of Latreille in the last edition of Cuvier's Règne Animal, and of Milne Edwards in his late work on the Crustacea, which latter I proposed adopting. The second volume of M. Edwards's work, however, in which the Entomostraca are to be treated of, not having yet been published, it will be necessary to follow Latreille's method in detail; and thus the first genus which I shall give a monograph of, is the genus "Cyclops:"—

Class.—CRUSTACEA.—Division, ENTOMOSTRACA.
Ord. BRANCHIOPODA—Section, LOPHYROPA—Group, CARCINOIDA.
Genus, CYCLOPS.*

Bibliographical History.—The first notice of any animal of this genus that I am aware of, is to be found in a little work of Stephanus Blancardus, the "Schou-burg der Rupsen, Wormen, Ma'den, &c.," published at Amsterdam, in 1688. His notice of it, however, is very brief, and the figure which he gives is very bad; being barely sufficient to enable us to make out that it is the *Cyclops quadricornis* that it is meant to represent. Leeuwenhoek appears to have been the first to have taken any lengthened or particular notice of the genus. In his "Epistolæ ad Societatem Regiam Anglicam," &c. (*Epistola* 121, *written in* 1699,) he gives a good many details of an insect which he found in fresh water, and whose habits he seems to have studied with considerable attention. He gives a figure of it also, which, though far from being correct, suffices to shew us that his insect is also the *C. quadricornis*. His observations upon it are very interesting, and he discovered amongst other things worthy of note, the great difference there is between the young and old insects, though he did not carry his observations so far as to trace the transformations which take place. In "No. 283 of the Philosophical Transactions, for January and February 1703," the same author gives a description of a polype (the *Hydra viridis* of Muller) growing upon the *Lemna* or duck-weed, which calls forth another paper from an anonymous correspondent in "No. 288 for November and December 1703," in which the writer mentions his having frequently observed the same polype growing upon insects, especially upon "two sorts of the crustaceous kind." These two species of insects, which he states are *monoculous*, he gives figures of, sufficiently correct to shew them to be the *C. quadricornis and Castor*, the first being a tolerable figure, though the second is very indifferent. The same writer also takes notice of a third insect of the same genus, which is much smaller and like a shrimp, but which he could never figure, evidently the *C. minutus*. Baker in his "Microscope, made easy, 1743," makes a few remarks upon these same insects, and copies the figures from the Philosophical Transactions, and in his "Employment for the Microscope, 1764," he publishes a letter from a correspondent, who gives a variety of details with regard to the insect which Leeuwenhoek describes, finds great fault with his figure, but gives a much worse one himself! De Geer in his "Memoires pour servir à l'histoire des Insectes," Vol. vii. published in 1778, is the next author, I believe, who has entered into any details with regard to any of the insects of this genus. He describes at considerable length, and figures with tolerable accuracy, the *C. quadricornis*, and confirms many of Leeuwenhoek's statements with regard to it, particularly the great difference between the old and the young insect. Otho Fridericus Muller,* is the next succeeding author who has particularly noticed this genus. Previous to his time,† with the exception of detached notices such as I have mentioned above, *one* species only of this genus seems to have been noticed by authors, which, like all the other Entomostraca then known, was arranged, and described under the general name *Monoculus*. He was the first to divide the different animals which figured under this name into distinct genera; and having discovered in the marshes, and on the shores of Denmark and Norway, a variety of species all agreeing in generic characters with each other, he formed them into one distinct genus, and gave the name of *Cyclops* to it. He has given a great many interesting particulars of many of these little creatures, but has fallen into two or three mistakes concerning them, which will be pointed out hereafter. Sometime after Muller, Ramdohr, in 1805, published in his work on the Monoculi* a very correct account of the anatomy, &c. of three of the species of this genus found in fresh water, accompanied with plates, which possess very considerable accuracy; and traces their whole transformation from the egg to the perfect insect. Louis Jurine (pere)† is the last author whom we shall mention, and is the one who, of all that have written upon this class of insects, has given us the fullest, most interesting, and most accurate information upon the fresh water species of this genus; and though he declines the name of *Cyclops*, which Muller had given it, and prefers the old term *Monoculus*, he has cleared up the mistakes which the former has fallen into, and completed, by a series of wonderfully careful experiments, the previous discoveries of Leeuwenhoek and De Geer. He takes no notice of the labours of Ramdohr, and seems to be ignorant of his discoveries, though the work of Ramdohr preceded his by fifteen years.

---

* "Class, Crustacea; Sub-Class, Maxillés; Legion, Entomostraca; Order Copépodes."—Milne Edwards.

---

* Entomostraca, seu Insecta testacea, &c. 1785.

† "Unicum quidem ante annum 1769, quo in *Synopsi Monoculorum* quatuor

Anatomy ‡.—In general form and appearance, the genus *Cyclops* approaches nearer to the terminating series of the *Malacostraca*, than do any other of the Entomostraca. § The body of the animal, which is soft and gelatinous, is inclosed within a horny shell, which covers it like a buckler, but opens inferiorly to give issue to the antennæ, organs of the mouth and feet. In general the body and tail are pretty easily to be distinguished from each other, and are composed of about ten segments, the body generally having four, and the tail six. In the upper or *cephalo-thoracic* segment of the body, which

---

novos Cyclopes fluviatiles publici juris feci, nempe Monoculus quadricornis Entomologis innotuit."—Entomost. p. 100.

[*] Beyträge zur Naturgeschichte einiger deutschen Monoculus-arten,—4to, Halle, 1805.

[†] Histoire des Monocles qui se trouvent aux environs de Génêve.-1820.

[‡] I have, in a great measure, followed Jurine in the anatomical *nomenclature*, adhering as closely as possible to the *terms* he uses.

[§] " Cancris macrouris maxime accedunt structura corporis pedum et antennarum, &c." Muller, p. 100.

is usually much the largest of all, we find the eye, the antennæ, mandibles, mouth, one pair of organs which Jurine calls hands, and one pair of feet. The eye is situated near the upper extremity of this first segment, and in the centre. It is generally pretty large, and is single. In *C. Castor* we can perceive the muscles which move it, and which are pretty numerous; the eye itself is of a beautiful ruby colour. The antennæ are four in number. The superior antennæ arise from the upper portion of the segment, on each side of the eye; they are always larger than the inferior pair, and are generally composed of numerous articulations, which are plentifully supplied with short setæ; the number of articulations differ in each species. The male is distinguished by a peculiarity in the antennæ, which at once marks the sex. In general they are shorter and thicker than in the female, and either one, the *right* one, as in *C. Castor*, or both, as in *C. quadricornis*, &c. have a swelling near the centre, or towards the extremity, followed by a moveable joint, which acts like a hinge, and which serves a very useful purpose in the act of copulation. The inferior antennæ, or antennules, are situated immediately beneath the preceding, and are composed of fewer articulations. Both of these organs are made use of by the animal to assist itself in progressive motion. Immediately below the antennules are the internal mandibles, which may be described as consisting of three parts, body, neck,* and " barbillon," but differing from each other in several respects in the different species. In the *C. quadricornis* are two organs, partly covering these, which Jurine calls external mandibles,† and which do not exist in the other species; and in the *C. Castor* and *minutus* again, are to be seen two round bodies which open and shut during the time the animal is taking food, and which do not exist in the *quadricornis;* these Jurine calls lips. The action of the internal mandibles is to reduce the objects of food when large into small pieces, fitted to pass by these lips into the mouth. Below the mandibles are situate two organs, which Jurine calls hands; a term which Muller had already applied to the same organs in one marine species he describes, the *C. chelifer.* ‡ All the species of the genus possess these organs. They are always situated in the same place; but all differ from each other in so many respects, that it will be necessary to describe them in each species separately. The use of these organs, according to the author I have already quoted so often, is to push constantly towards the mouth a

---

* Prolongation of Jurine.

† " Mâchoires."—Latreille.

‡ " Entomostraca."—P. 114.

current of water, carrying along with it the particles destined for the insect's food. Immediately beneath the hands are situated the first pair of feet. They are double, consisting of two stalks arising from a common base, each stalk consisting generally of from two to four articulations, more or less furnished with setæ, but varying very much in different species, especially the marine ones. Attached to the next three segments of the body, and arising from the interstices between each, we find three other pairs of double feet, in general resembling each other exactly. These feet act as true fins, and as they are not at all used by the insect for *walking*, the term *feet* is not so correct as that of *fins*. In the tail we find placed the organs of generation and their appendages. In the first segment, we observe in the female two organs, which differ in appearance in each species, and which, as their use is to give support to the oviducts which furnish the envelope of the external ovaries, are called by Jurine, "les supports, ou fulcra." At the junction of the second ring with the third in the same sex, in the *C. quadricornis*, is situate the vulva; this opening forms also the mouth of the *canalis deferens*, which communicates directly with the internal ovary, and gives passage to the eggs. In the male of this species, we find the genital organs situated also in the second segment of the tail, consisting of an oval body or papilla, which gives origin to a prolongation of three short segments. In most of the other species the male organs appear to be situated in the corresponding segment to that in the female, which carries the "fulcra," or "supports," The external ovary, or bag of eggs, springs from where the second segment articulates with the third, and is attached to it by a very slender pedicle. The internal ovaries consist of an opaque mass of solid-looking matter, composed of numerous round globules of a dark brown colour, disposed round the alimentary canal, and occupying a considerable space of the interior of the body. This, as I have already stated, has a direct communication with the opening at the junction of the second with the third segment of the tail, the *canalis deferens* of Jurine; and it is through this canal that the eggs pass into the external ovary. The alimentary canal is very perceptible, beginning behind at the place which I have mentioned as the situation of the lips, and terminating at the extremity of the tail. In the *C. Castor* the heart is very distinctly to be seen under the second and third segment of the body. It is oval, and gives origin to two vessels of equal size, one going to the head, and the other to the tail, and has another organ attached to it, which Jurine considers the auricle. The pulsations of the heart are very frequent, from 112 to 120 in the minute.

Habits, manners, &c.—The insects which belong to this genus are to be found both in the fresh water and the sea. The fresh water species abound in the muddiest, most stagnant pools, and in the clearest springs,—and the ordinary water with which the inhabitants of London are supplied for domestic purposes, contains them often in great numbers. The marine species are to be found, often in immense abundance, in small pools on the sea shore, within high water mark, living amongst the sēa weeds and corallines, which frequently fringe so elegantly the beautiful little wells and clear round pools which are hollowed out in the rocks by the sea shore, and are equally abundantly to be met with in the open ocean, where, by the curious luminous properties they possess, they assist in producing that beautiful phosphorescent appearance of the sea, which has so much puzzled naturalists to discover the cause of. It is amazing, when we examine the pools of water which are to be met with in our fields, or sea shores, to find such infinite myriads of little creatures sporting about in all the enjoyment of existence—and it is exceedingly curious and interesting to know the extraordinary fertility of such apparently insignificant creatures. Specimens of the *quadricornis* are often to be met with carrying thirty or forty eggs on each side,* and though the other species which have only one external ovary, do not carry so many, still the number is very considerable. Jurine has with great fidelity watched the hatching and increase of the *quadricornis* in particular, and has given a calculation which shews the amazing fertility of the species. He has seen one female, isolated, lay ten times successively—but in order to be within bounds, he supposes her to lay eight times within three months, and each time only forty eggs. At the end of one year this female would have been the progenitor of 4,442,189,120 young!! The first mother lays forty eggs—which at the end of three months, at eight layings during that time, would give 320 young. Out of this number he calculates 80 as males, (there being in every laying a great proportion of females,) the remaining 240 are females. The following table will then shew the prodigious extent of their fecundity:†

---

* Leeuwenhoek says, that in the specimens which occurred to him of the *quadricornis*, he counted the eggs to be three or four in breadth and nine or ten in length. Epist. ad. Soc. Reg. Ang. p. 138.

† Jurine, Hist. des. Monoc. &c. p. 32.

	No. of layings.	Time employed for these 8 layings.	Total—each laying supposed to be of 40 young.	Subtract for males.	Females remaining.
1. mother	8	From 1st Jan. to end of Mar.	320	80	240
1. family, of females 240	8	From 1st Apr. to end of June.	76,800	19,200	57,600
2. family, of females 57,600.	8	From 1st July to end of Sep.	18,432,000	4,608.000	13,824,000
3. fam. of fem. 13,824,000.	8	From 1st Oct. to end of Dec.	4,423,680,000	1,105,920,000	3,317,760,000
			4,442,189,120	1,110,547,280	3,331,641,840

A single copulation suffices to fecundate the female for life. The male seems very ardent in his amours. By way of prelude, he seizes hold of the hinder feet of the female with his antenna, which being furnished at its extremity with the hinge joint, already described, forms a fastening round her feet which she cannot unloosen by any exertion—and thus he is carried about with great rapidity for some time. The female, however, at length stops, wearied by her exertions, when the male seizes the favourable moment, and in the twinkling of an eye (as Jurine expresses himself) makes a double copulation—one on each side. According to Muller, the male organs are situated in the swellings which we perceive in one or both antennæ of that sex, and which are characteristic of it. Carried away by the analogy of the *Arachnides,* and seeing the male seize hold of the lower part of the female with his antennæ, he immediately conjectured that the organs resided in the swellings which mark the antennæ of the male, and were applied to the vulva, which he correctly enough states to be situated in the tail.* This mistake, however, Jurine has cleared up, having shown the organs in both sexes, and watched the act of copulation itself. When the mother is about to lay, we may perceive the material of the eggs, which I have described above under the name of internal ovary, divide into two columns, one on each side, and pass through the *canalis deferens,* covered with a fine pellicle, which forms the sac in which the eggs are contained when extruded. This bag of eggs, or external ovary, remains suspended at the tail of the female for several days, varying from two to ten according to temperature of weather, &c.† The eggs themselves during their sojourn there do not increase in size, but undergo various changes in colour, &c. and at the proper time the ovary opens, and the young ones are ushered forth into life, as unlike the parent as can well be imagined. I have already said that Leeuwenhoek had noticed this difference between the young and old, and upon first observing it, he seems to have been much surprised at the unexpected discovery. He repeated his experiment, therefore, of separating an insect with the ova attached to the tail, and found the same result. "Ea hisce visis," he concludes, "certa mihi persuasi ea animalcula, quæ jam oculis meis observabantur, ex ovis illis nata esse."[*] He watched them for seven or eight days, and found them increased in size—but here, when just on the threshold of discovery, he seems to have stopped, and he makes no farther mention of a continuation of his observations. De Geer also noticed this curious fact—confirms the observations of Leeuwenhoek as far as they went—gives figures of the young at different stages of their growth—but stopped short in his observations also, after having watched them about fifteen days. Notwithstanding this Muller could not persuade himself that such dissimilar creatures could be the same, and he has accordingly, without giving sufficient credit to these illustrious men, or watching the hatching and progress of the young himself, formed these imperfect insects into two different genera, which he has called Nauplius and Amymone.[†] Ramdohr and Jurine, however, have both clearly rectified this mistake, and fully corroborated the assertions of Leeuwenhoek and De Geer, by following out the transformations in all their extent. The time occupied in this process varies much according to the season of the year, and the temperature. This latter I have found produces an amazing difference in the length of time so occupied, and I have no doubt also, from my experiments, that the process has been retarded or hastened on, according as the vessel in which they have been kept has been placed in a light or a dark situation. According to Jurine, the time occupied in the case of the *C. quadricornis* has never been less

---

* Entomostraca, p. 16–17.

† Leeuwenhoek says they exclude their ova in the space of one day or night, and bring them to perfection in the space of three days.—(Epist. ad Soc. Reg. Ang.)

---

[*] Epist. ad Soc. Reg. Ang. p. 139.

[†] Entomostraca, pp. 39–48, Plates i. and ii.—It is stated by Latreille, and echoed by some other writers, that the *Amymone* of Muller is the young of the *Cyclops* in its earliest state, when it has as yet only four legs, and that when it receives the additional pair it then becomes the *Nauplius*. This is not correct. The different species of *Amymone* are the young of the *C. minutus* in different stages, and of one or two of the marine species; and never assume the form of the *Nauplius*. The *Nauplius* (at least the N. saltatorius) is the young of the *C. quadricornis*, which at its earliest stage resembles fig. 3 of plate I. of Muller. The *N. bracteatus* I have never seen, and do not know.

than twenty days, and in a series of very careful experiments which he made in February and March, he found it to occupy twenty-eight days. For the first eight days, they underwent little or no change —between the eighth and thirteenth the body appeared a little more elongated—between the thirteenth and nineteenth, the line of demarcation between this increase of length and primitive size was traceable by a line of a brown colour, and the insect had acquired a third pair of feet—between the nineteenth and twenty-fifth, no great change took place, only the third pair of feet were more developed—between the twenty-fifth and twenty-eighth the first moulting took place —and thirteen days afterwards they moulted a second time. In a series of experiments which I undertook, upon the same species, in the end of June and beginning of July, when the thermometer was frequently above 80° during the day, I found the time occupied in the process, in some instances, very much shortened. In one brood which were hatched on the 21st of June, I found some had completed their first moulting on the 1st of July, or on the eleventh day. In another brood hatched on 22d June, I found the same result, several of the young having undergone a first moulting on the 2d July. On the 4th I could only see one that had not moulted—and next day, the 5th, this one had also undergone the change: the second moulting in many of them took place only a few days after the first. In another brood hatched a little earlier in June when the weather was not so hot, I found the changes take place as follows: When hatched the insect appeared of an oval shape, (Plate VIII. Fig. 9,) having two thick antennæ of three articulations each; two pairs of feet, bifid at extremity; in the upper pair, one division consisting of two and the other of only one articulation; in the lower, both divisions having only one articulation; extremity of body furnished with two short setæ on each side. On the eighth day, the body is considerably elongated, and a distinction has begun to be perceptible between this increase and original size, with some appearance of setæ where the third pair of feet afterwards appear; intestine very distinct, (Fig. 10.) On the fifteenth day, the third pair of feet have become distinctly formed; the lower part of body more elongated, the elongation marked by another line of demarcation; the setæ on the edges of the antennæ have become visible, and those of the feet longer and more numerous, whilst the second pair of feet have the upper division of two articulations, (Fig. 11.) On the seventeenth day, moulting has taken place—the body is divided into two segments; tail into three; the terminating one cleft at extremity, each cleft sending off a long seta; antennæ of about six articulations; the antennules have become distinctly visible, and the feet have assumed the appearance they afterwards bear, (Fig. 12.) At each moulting the number of segments into which the body and tail are divided increase in number; the number of articulations and the length of antennæ increase, &c., but it is not till after the third moulting that the insect is perfect and capable of producing its species.*

A question has been started whether the *Cyclops* should be considered oviparous or viviparous insects; and it appears to be one of some difficulty, as they would seem from what I have stated to be both. Geoffroy states that all the *Monoculi* are oviparous.† De Geer also says they are oviparous. "However," he immediately adds, "as the *Monoculi* never quit their eggs before the young ones are hatched, we may perhaps regard them as viviparous."‡ Jurine says it is difficult to decide. Viviparous young, he says, increase in size every day, and have constant need of a mother's care—if she die, all die. As, however, the young of the Cyclops do *not* increase in size after passing from the internal ovary, and as, from numerous experiments which he details, they were found, after having passed into the external ovary, to be independent of the life of the mother, even if she were killed by spirits of wine—they must, he concludes, be considered oviparous. §

The process of moulting, under which the little creature frequently succumbs, is both interesting and curious. The new shell or covering having grown under the old one, when the process of changing it commences, the insect fastens itself to the bottom or side of the vessel in which it is, or to any solid object near it, so as to give itself support. It then, by moving its limbs, and shaking the valves of the shell, the new parts at the same time coming forward, loosens the old covering, and in a short time frees itself from the exuviæ altogether, leaving behind, the sheaths of the limbs, hairs, plumes, and even the minute setulæ that almost escape the power of the microscope itself from their fineness, such as the delicate plumose setæ which adorn the long filaments of the tail. "How, beyond all idea," says Muller, from whom I have taken this description, "this most subtle fineness, for they are sheaths containing other smaller sheaths, which again include other organs smaller still." * The number of times they moult during life is not known, but Jurine says, they ordinarily, though not always, moult before each time of laying eggs. They certainly do not always do so; and perhaps the frequency of their moulting may depend much upon the temperature, the seasons, &c.

---

* The recent alleged discoveries of Mr Thompson, of the metamorphoses which the young of several genera of the *Cirrhipedes* and *Crustacea* undergo, have excited a good deal of attention of late to this very interesting subject. According to Mr Thompson, the genus Zoea of Bosc, which figures away in many of our arrangements, as one of our Entomostraca, is nothing more nor less than the larva of the common crab, in its first state. (Vide Zoological Researches, No. I. and succeeding.) M. Burmeister has verified Mr Thompson's discoveries with regard to the metamorphoses which the *Cirrhipedes* undergo; but many doubts still continue to be thrown upon his observations with regard to the genera of *Crustacea*. One or two genera of each of the great groups of the *Malacostraca* have been apparently satisfactorily ascertained to undergo no metamorphosis—and the labours of M. Rathke, with the observations of other writers, and especially of Mr Westwood, in a paper published in the Philosophical Transactions for 1835, leave the matter still in doubt, and show the necessity of Mr Thompson's observations being confirmed before this interesting question can be settled. The insects of the genus *Cyclops* approach so near to some of the *Malacostraca*, however, that were we to reason from analogy alone, we might easily conceive Mr Thompson's discoveries to be partly confirmed—as the changes which they undergo are almost equally wonderful with any of the genera which he has made the subject of his observations.

† Histoire abrégée des Insectes, p. 654.

‡ Mem. pour servir à l'hist. des Insectes, Vol. vii. p. 435.

§ Hist. des Monoc. p. 17.

Having the experiments of Spallanzani and others, upon the reproduction of mutilated members in various animals, before his eyes, M. Jurine instituted a series of experiments upon the *C. quadricornis*, to see how far this power existed in this genus of insects. In most of his experiments he failed, the insects having died before they moulted, and without showing any evident change in the mutilated members. At length he succeeded. He cut off about two-thirds of an antenna in a female which lived and moulted, reappearing, after moulting, with a beautiful perfect new antenna, the old one of the cast shell not having shown the least indication of a change.†

Some authors have asserted that these insects possess a wonderful power of resisting drought, and that when, by reason of the summer heats, the marshes become dried up, the little creatures do not die, but as soon as the mud becomes moistened by the rain, they recover entirely. Jurine, however, doubts this, and instituted a series of experiments to prove that they have not this faculty. He selected 12 of the *C. quadricornis*, removed them out of the water, and allowed them to remain fifteen minutes dry; 7 of them he found to be irrecoverably dead, the remaining 5 recovered. Again he selected 12 others, and allowed them to remain twenty minutes dry—11 out of the 12 died. A third time he selected 12, and after exposing them in a state of dryness for twenty-five minutes, he found that all had irrecoverably perished.[*]

---

* Entomostraca, p. 9.

† Hist. des Monoc. p. 40.

Their power of resisting the action of cold, however, according to Muller, is much greater than their power of defying drought. In an experiment which he details, he says, that he exposed some individuals of the *C. quadricornis* in a glass vessel to a freezing air, and that when fully frozen, he continued the exposure for twenty-four hours. At the end of that time he placed the vessel containing their frozen bodies in a warm bath, watching the effect of this upon them frequently during the succeeding twenty-four hours, but without seeing any motion. Next morning, however, upon looking into the vessel, he observed, not without wonder, the insects alive, and swimming about as before congelation, the females with their bags of eggs adhering to them as usual;[†] they did not all recover, but the greater part were restored to life. In some other similar experiments upon these insects, especially the *C. castor*, throwing them into a state of asphyxia by means of spirit of wine, and then restoring them to life again, Jurine found that the first part of the body to show irritability and a return of motion was, not the heart, as perhaps might be expected, but the alimentary canal—the heart seems to be next—then the antennæ, and last, the feet.

De Geer asserts that the *Cyclopes*, along with the other Monoculi, are nourished by animalcules. Leeuwenhoek, in addition to this, asserts that when in want of other food they devour their own young. De Geer also says, that he has seen this frequently to be the case. Jurine has repeatedly seen the same, but says, in vindication of his beloved insects, that it would appear from what he has noticed, that they do not do so *from taste*, but that the helpless young cannot resist the action of the whirlpool the mother causes around her, and are thus carried unconsciously into the old one's mouth. I have also frequently noticed the sudden disappearance of the young when no other insects were in the vessel but their mother, and who, it is most probable, must have devoured them, and from what I have noticed, I think the variety *albidus* of the species *quadricornis* is the one which possesses this carnivorous propensity in the greatest degree. Muller, however, maintains that the *C. quadricornis*, as well as others of the Entomostraca, live upon vegetable food; and I have mentioned in my former paper (page 40) the experiment he instituted upon the subject.[*] That he is wrong cannot be doubted, I imagine, and there is every reason to presume, that their being carnivorous serves a most useful purpose in the economy of nature. The adults in their turn fall victims to, and are devoured by, other insects, the chief of which are the Hydrachnæ, Hydræ, and larvæ of aquatic insects, which destroy them in such vast numbers, as in some measure to counterbalance the most extraordinary fertility which they possess, and which I have already mentioned above.

---

[*] Hist. des Monoc. p. 39.

[†] Entomostraca, pp. 5, 6.

Species.

A. *Fresh Water Species.*

1. *Cyclops quadricornis.*—Plate VIII. Fig. 1, 1-14.—*Specific character*—Antennis longis; corpore ovato; cauda recta bifurcata; furcâ utrâque setis quatuor plumosis instructâ; ovariis externis duobus.

Synonimes, &c.—Cyclops vulgaris, *Desmarest,* Considerat. generales sur les Crustacés, p. 362.

Monoculus quadricornis, *Jurine,* Hist. des Monoc., &c. 1820, pp. 1-49. Plates 1, 2, 3.—*Figures excellent.*

Cyclops quadricornis.—*Ramdohr,* Beyt. zur Naturg. einigen deutschen Monocarten, 1805. Pp. 1-6, t. 1, fig. 1-10; t. 2, f. 1, 3.

Cyclops quadricornis—*Muller,* Entomostraca, &c. p. 109, tab. 18, fig. 1-4, 1785.—*Figure pretty good.*

Nauplius saltatorius, (the young in its first state,) *Muller,* Entomost. p. 40, tab. 1. fig. 3-7.

Eichhorn, Beytrage zur Naturgeschichte dar Kleinsten Wasserthiere, p. 54, tab. 5, fig. *m. n.* 1781.—*Very bad figure.*

Le Monocle à quatre cornes, *De Geer,* Memoires pour servir à l'histoire des insectes, tom. 7, p. 483, plate 29, fig. 11-12, (adult insect,) plate 30, fig. 5-9, (egg and young,) 1778.—*Figures not quite correct.*

Monoculus quadricornis, *Fabricius,* Systema Entomologiæ, p. 295, 1775.

Der Naturforscher, *Stuck* 5, p. 247, 1775.

Neue Mannigfaltigkeiten, i. p. 640, fig. 3, 1774.—*Figure apparently copied from Roesel.*

Le Monocle à queue fourchue, *Geoffroy,* Hist. abrég. des Insectes, Vol. ii. p. 656, No. 3, plate 21, fig. 5, 1764.—*A very bad figure.*

Pediculus aquaticus, *Baker,* Employm. for Microsc. p. 383, pl. 15. fig. 1-4. 1764.[*]

Monoculus quadricornis, *Scopoli,* Entomologia Carniolica, p. 413-1139, 1763.

Monoculus Apus, *Poda,* Insecta Musei Græcensis, p. 125, tab. 1. fig. 11, 12, 1761.[†]

---

[*] Geoffroy also says, that *all the Monoculi* live upon vegetable matter alone. —Hist. abrég. des Insect. Vol. ii. p. 654.

[†] Baker's correspondent complains sadly of the figures which Leeuwenhoek gives, as being very incorrect, and yet the figures which he gives are ten times worse than Leeuwenhoek's!!

[‡] The name of Mon. Apus is given incorrectly by Poda, as his figure, though very indifferent, is clearly that of the C. quadricornis.

Roesel, der Insecten Belustigung, Tom. iii. p. 606, tab. 98, fig. 1, 2, 4, 1755.*

Monoculus quadricornis, *Linné*, Fauna Suecica, No. 2049, 1746.

Baker, Microscope made easy, p. 93, plate 9, fig. 1, 2, 1743. *Figures copied from Philos. Transact.*

Philosophical Transactions, No. 288, accompanying plate, fig. 5, 1703.—*Figure tolerably correct.*

Leeuwenhoek, Epistolæ ad Societatem regiam anglicam, p. 142, fig. 1, 2, 3, 1699.—*Figure incorrect.*

Blancardus (Stephanus) Schou-burg der Rupsen, Wormen, ma'den, &c. p. 151, tab. 13, fig. B. 1688.—*A very bad figure.*

Habitat.—Standing water, every where, all the year round.

Description.—From 7–12ths to 9–12ths of a line long.—Body (Plate VIII. Fig. 1. *a*,) of four segments. Tail (*b*) of six—the latter terminating in two lobes. First ring of body much larger than any of the others, being equal in size to the other three. Second and third nearly equal in size, the fourth being smallest. Antennæ (*c*, *c*,) of numerous articulations, from seventeen to twenty; each articulation throws forward a seta, sometimes two. In male, both antennæ (Fig. 2, *a*, *a*,) possess a peculiar swelling and hinge-joint. Antennules (Fig. 1, *d*. *d*.) of four articulations, each furnished with several setæ, terminating one having six, of unequal length. Internal mandibles (Fig. 4,) composed of three parts, body (*a*,) neck (*b*,) and "barbillon" (*c*.) Body of an ovoid shape, convex on upper and concave on under surface, in which concavity is lodged its motor muscle. Neck, a sort of petiole turned upon itself, and dilated at extremity, in which are implanted six pretty strong teeth. "Barbillon," composed of one ring and two long filaments. External mandibles (Fig. 5,) situate a little behind the others, convex externally and concave internally, give origin to several filaments and processes, and are terminated by two strong horny teeth. This organ does not exist in the other species. Hands; (Fig. 6,) each is divided to the base into two parts; the internal (*a*,) which Jurine compares to a thumb, is much smaller than the other, is formed of three articulations, the two first of which have on inner edge several pretty strong plumose spines or setæ, while the third, which is much the smallest, is terminated by three spines. External division (*b*,) is also composed of three articulations, upon the first of which reposes the thumb; the second is much longer, and has on internal side, a tubercle from which issues a plumose spine; the third, the smallest, consists of three parts, the middle piece triangular-shaped, divided into two strong spines; the internal, situate at its root, giving origin to a long and strong spine, which, near the middle, gives off another; and the external, which is cleft into two strong spines. These five strong spines are called fingers by Jurine, but, as represented in the accompanying plate, sketched as they occurred to me, they differ very widely in appearance from the fingers represented by him in his figure of these organs; * and though most of the other parts of the insect, as given in his plates, are very correct, I cannot help thinking, however much indebted we may be to the fair artist, that the representation of these parts borrows a good deal from Mademoiselle Jurine's imagination. Feet (Fig. 1, *e*, Fig. 7,) eight in number, or four pairs; each foot is double, or composed of two stalks arising from a common base; each stalk consists of three articulations, and each articulation is furnished with plumose setæ, the terminating one having six or seven. The first pair of feet do not differ from the rest. First ring of tail is very small. In the male (Fig. 13,) the second ring is the largest, while in the female (Fig. 1,) it is the third. The last gives off two long lobes, making the tail appear bifurcated, each lobe giving origin to four plumose setæ, the two intermediate of which (Fig. 1, *f*, *f*,) are much the longest, and have near upper extremity a small joint, which adds much to the suppleness of these fine organs. The fulcra or supports, in this species, are very small. Male organs of generation (Fig. 13, *a*, *a*,) are two oval bodies, situate on each side of second articulation of tail, and terminating in a prolonged point. Internal ovaries (Fig. 14, *a*, *a*,) pretty large and divaricate. External ovaries (Fig. 3,) of same colour as adult, and containing in an old female thirty or forty eggs on each side.

---

* The figure of the Cyclops is given in this plate by Roesel, chiefly as being the resting-place for a species of polype which he describes, and with which, as often happens, the body of the insect is almost completely covered. Though not *very correct*, it is much superior to the figures given by Eichhorn, Baker, Geoffroy, &c. and really forms with its clusters of polypes a very pretty plate.

Jurine makes five distinct varieties of this species,† three of which I have frequently seen in this country. 1. *Rubens*, 7-12ths of a line long without the tail filaments; of a reddish colour; external ovaries of same colour as adult animal, (Fig. 14,) 2. *Albidus*, 8-12ths of a line long; of a light-grayish colour; external ovaries nearly at a right angle with tail, (Fig. 3;) body more rounded than in Rubens; male one-third less than female. 3. *Viridis* (Fig. 1,) 9-12ths of a line long; largest of all the varieties; of a green colour, more or less deep; external ovaries not so much at a right angle with tail as preceding.

---

* Plate 2, Fig. 6, 7.—The figure of these organs, as given by Ramdohr, tab. ii. fig. 2, of his work, though not altogether correct, is much nearer the truth than that of Jurine.

† "Variat colore albida, fulvescente, viridi et rubro."—Muller, p. 112.

2. *Cyclops Castor.* Plate X. Fig. 1.—*Specific Character.*—Antennis longioribus; cauda bifurcata; furcâ utrâque setis quinque plumosis instructâ; ovario externo unico.

Synonimes, &c.—Dioptomus Castor, *J. O. Westwood,* Lardner's Cabinet Cyclopædia (ined.)

Cyclops Castor, *Desmarest,* Consid. gen. sur les Crustacés, p. 363.

Monoculus Castor, *Jurine,* Hist. des Monoc. pp. 50–73, plates 4, 5, 6. 1820. *Figures beautiful.*

Cyclops lacinulatus, *Ramdohr,* Beyt. zur Naturg. pp. 7–9, tab. ii. fig. 4–12. 1805.

Monoculus Cæruleus.—M. rubens, *Fabricius,* Entom. System. 1792.

Cyclops Cæruleus, *Muller,* p. 102, tab. xv. fig. 1–9.—C. rubens, *Muller,* p. 104, tab. xvi. fig. 1–3.

C. lacinulatus, *Muller,* p. 105, tab. xvi. fig. 4–6. 1785. *Figures tolerable.*

Baker, Microscope made easy, p. 93, pl. 9, fig. 2, 1743.—*Figures copied from the Phil. Trans.*

Philosophical Transactions, No. 288, fig. 6 of accompanying plate. 1703. —*Very bad figure.*

Habitat.—Ponds and slowly-running water, as at Dunglass Pond, Yetholm Loch, &c. &c. in Scotland; New River, London. Not so common as preceding species.

Description.—1½ long. Body of six articulations; first largest. Tail of five; the last sending off two lobes, each of which gives origin to five plumose setæ. Eye large, of a fine ruby colour. Antennæ large and strong, of about twenty-six articulations; each segment furnished with one or more setæ; last one terminated by five unequally long ones. In the male, the right antenna alone has the swelling and hinge-joint which characterize the sex. Antennules (Fig. 2) bifid; two branches of unequal length, arising from a common stalk. The shorter of the two can be carried backwards or forwards at pleasure of animal, and is composed of three articulations, the first of which is short, and inserted into common foot-stalk; the second is furnished on its edge with a dozen of small dentations, from which arise as many hairs; and the third is provided at extremity with three long hairs.* The longer branch is also composed of three articulations; the first articulated with body of animal; the third terminates in several long filaments, which have an articulation in the middle of the length, adding much to their suppleness.† Internal mandibles (Fig. 3) resemble somewhat those of preceding species, but have the "barbillons" much larger and bifid, while the

---

* This part of the antennule is what Muller calls the *palpi.*

† This portion is what Muller describes under the name of *remi.*

neck terminates by a horny acute point, under which are six small teeth on the same plane. This horny point, Jurine thinks, replaces in some degree the external mandibles, which in this species are wanting; and thus not having an organ by means of which to seize its prey, it uses its antennules for that purpose, putting them into rapid motion, causing a regular whirlpool in the water, which attracts every object into its centre, where is situate the mouth. Behind the mandibles, and a little lower, are two small round bodies, almost transparent, which do not exist in the preceding species. These two bodies, when the animal eats, separate from each other so as to open a passage for the food, which is seen to pass through the opening thus made. Jurine calls these the lips. They are furnished with a barbillon (Fig. 4,) which consists of three parts, internal, middle, and external, all provided with hairs. Hands (Fig. 5,) different from those of *quadricornis*, each divided at their origin into two distinct parts—anterior, smaller of two, may be called the thumb, and is composed of three rings, the anterior edge of which is rough with small eminences, from which spring a number of pretty long hairs directed towards mouth; the posterior part is much larger, and consists of six rings, the two first very large in proportion to the other four.[*] Feet (Fig. 6) are the same as in *C. quadricornis*. Under the last segment of body in the male, we perceive two stalks, almost cylindrical, both arising from one common base. (Fig. 7.) The right one consists of five segments, and is terminated by a strong hook; the left one has only four rings, and is shorter. These bodies are considered as the sexual organs by Jurine, the shorter of the two stalks containing, he believes, the organ itself.[†] In same situation, in the female, we find the *fulcra* or "supports" (Fig. 8) which Muller calls "uncinuli," and which are of a very irregular shape; and underneath the first ring of tail is the vulva, through which also the eggs pass into external ovaries. Above the vulva we see a triangular reddish body, which Jurine calls operculum vulvæ. In some specimens of this species, we occasionally see on each side of the tail, two, four, or six elongated bodies, the direction of which is always backwards. In females, they are found adhering round the operculum vulvæ by a long and slender petiole, from which issues a sort of demi-capsule, which Jurine compares to an acorn. From this envelope springs a cylindric transparent body, which shows in its interior a longitudinal opaque line. These are what Muller calls the *laciniæ*, which he regards as some particular organs belonging to the animal, and are sufficient, he considers, to constitute it into a distinct species, named by him *C. lacinulatus*. At first observing them, Jurine says he was disposed to consider them also peculiar organs, and that it was a distinct species. After very attentive observation, however, he found the number to be irregular; and sometimes he found them in males adhering to the base of the posterior feet; he found them to separate spontaneously from the body of the animal, and, in short, discovered them to be nothing less than *animalcules*, the base upon which they were planted being a kind of moss, with which these insects are often covered. Jurine says that it is in the months of March and April that these insects are to be met with; but the only time I ever saw a specimen with these peculiar bodies adhering was in the month of October. It was taken from Yetholm Loch, Roxburghshire; but an accident occurring to the vessel in which they were placed, prevented me from any lengthened observations upon them. I have not met with the C. cæruleus of Muller; but Jurine distinctly asserts, that the three species of Muller, cæruleus, rubens, and lacinulatus, are mere varieties of one species; and which, from the resemblance he fancied he saw in the tail of the female, when loaded with eggs, to that of the beaver, he has named Monoc. Castor. It is a very beautiful species, and is the most elegant of all we know. "Son port," says Jurine, "est élégant; sa maniére de s'élancer dans la liquide est noble et hardie; ses mouvemens sont libres et faciles; tout enfin annonce chez lui une superiorité qui characterize la grandeur de l'éspéce à laquelle il appartient."

---

[*] These organs, the hands, are what Muller describes under the name of *laminæ radiatæ*.

[†] These are the "Spicula duo curva" of Muller.

3. *Cyclops minutus*, Plate IX. Fig. 1–14. *Specific Character.*—Antennis curtis; corpore lineari; cauda biloba; lobo utroque setis duobus inæqualibus instructo; ovario externo unico.

Synonimes, &c.—Canthocarpus Staphylinus, *J. O. Westwood*, Lardner's Cab. Cycl. (ined.)

Cyclops staphylinus, *Desmarest*, Consid. gen. sur les Crustacés, p. 363.

Monoculus staphylinus, *Jurine*, pp. 74–84, pl. 7, fig. 1–19. 1820.

Cyclops minutus, *Ramdohr*, pp. 10–13, tab. iii., fig. 1–9. 1805.

Monoculus minutus, *Fabricius*, Tom. ii. p. 499, No. 45. 1792?

Cyclops minutus, *Muller*, p. 101, tab. xvii. fig. 1–7.

Amymone (young state,) *Muller*, p. 42, tab. ii. 1785.

Eichhorn, Beytrage zur Naturg. der Kleinsten Wasserthiere, p. 53, tab. v. fig. K, L. 1781. *Very bad figures.*

Do. do. (young state,) p. 41, tab. iii. fig. *p.*

Satyr, *Baker*, Employ. for Micros. (the young state,) p. 314, pl. 12, fig. 23, 25, 26. 1764.

Philosophical Transactions, No. 288, for November and December, 1703.

Habitat.—Pools and ditches. Common all the year round.

Description.—Body and tail not distinctly separated from each other; composed of ten segments, first segment largest, last one, terminating in two short lobes, from which issue two long filaments, slightly serrated on their edges. At the junction of the fifth with the fourth articulation, the body is very moveable, and the animal frequently turns up the posterior extremity upon the anterior, in the manner of the species of beetle called *Staphylinus* (Plate IX. Fig. 1.) Jurine has taken the trivial name of *Staphylinus* from this circumstance, objecting to the name of *minutus* by which Muller designates it, as he says it is possible we may find still smaller species. I have, however, retained the name which Muller gave it, as he is the first author who has given any lengthened description of it. The males are smaller than the females—antennæ, (Fig. 1, 2, *a a*) very short compared with those of preceding species. In female (Fig. 3) composed of nine articulations; in male (Fig. 4.) only of seven. Between fourth and fifth articulation, in both sexes, we see a small lateral ring, of one short articulation and three or four short setæ. In male both antennæ have swelling and hinge-joint, the swelling existing chiefly about the fifth articulation, all the five first, however, being of greater size than the corresponding ones in the female; hinge-joint near the extremity. Antennules* (Fig. 5.) composed of two articulations: upon first articulation is placed a small shoot terminated by four setæ, second articulation furnished with seven short spines on upper edge, and terminated by four longer ones. Jurine makes the antennules consist of six articulations, and his figure of these organs differs entirely from mine, which, after frequent and repeated examinations, never varied in their appearance in the slightest. Mandible (Fig. 6.) in figure resembles very much the internal mandible of the quadricornis, the "barbillon" springing from the centre, and consisting of three articulations, terminated by several setæ. The lips in this species are easily to be seen, and are provided also with a "barbillon," which is a pretty large oval body (Fig. 7.) dividing at extremity into four fingers of equal length, each furnished with three setæ. Hands (Fig. 8.) of more simple organization than in the preceding species. They consist of three articulations, the last of which appears to be a very fine hook, forming with the other two, an angle always directed forwards towards the mouth. These hooks appear to stop all molecules of food in their passage, and by their constant motions carry them to the mandibles. Feet (Fig. 9, 10,) much longer in proportion than in either of the preceding species, and differing in some respects from each other. The

---

* "Palpi" of Muller.

5. *Cyclops Stromii.*—Plate IX. Fig. 23-25. *Nova species.—Specific Character.*—Antennis curtis; capite rostrato; manibus unguiculatis, cauda biloba, setis duobus brevibus instructa; ovario externo unico.
Habitat. Shore at Cockburnspath, Berwick bay, &c.

Description.—Body and tail, as in the others, consist of ten segments, gradually tapering to extremity without any very decided difference between tail and body. First segment the largest, furnished with a conical beak—last segment terminating in two lobes, which give issue to two setæ, much shorter than in the preceding species, being scarcely half the length of the body. Antennæ of about eight articulations; at junction of fifth with sixth, having a lateral ring. In male (Fig. 25) the swelling and hinge-joint are as in preceding species. All the articulations of the antennæ throw forward one or more short setæ. Antennules, as in the preceding species, of two articulations, the second being terminated by about four pretty long setæ. Mandibles were not seen; hands, like those of *C. minutus*, consist of two articulations, and a pretty strong hook, which points upwards. First or thoracic pair of feet have the external or superior stalk much smaller and shorter than the other, and is divided into three joints, the last of which is terminated by three pretty strong setæ or small hooks. The internal or inferior is much the longer of the two, and consists of two articulations, the first being very long in proportion to the second, which is exceedingly short and terminated by a curved hook. The abdominal feet are exactly the same as in last species—and the fulcra or supports which I could not examine accurately, seemed to be also similar to those of the *chelifer*. I have named this species after Ström, who has given a description of a species of Cyclops in the Acta Hafniæ, 9th vol. which has some resemblance to this, as translated by Muller in his Entomostraca, under the name of *C. brevicornis.* *

6. *Cyclops furcatus.* Plate IX. Fig. 26-28. *Nova species.—Specific Cha-*

---

* In the edition of the Acta Hafniæ in the British Museum, the figures which Ström gives of the *brevicornis* are unfortunately awanting. In Muller's description of the *brevicornis*, which he professes to take from Ström, he says the tail setæ are very short, "setis caudæ brevissimis," while Ström in his description says they are very long, "setis caudæ binis longissimis"! In my paper in the Transactions of the Berwickshire Naturalists' Club, I have quoted the species described above as the *C. brevicornis*, taking the description as given by Muller, not having at that time seen the Acta Hafniæ—and not being aware of the discrepancy which exists between the two descriptions. Vide Ström's paper in "Det Kiobenhavnske Selskabs skrivter," 9th vol. p. 590,1765.

racter.—Antennis furcatis; capite brevi-rostrato; manibus unguiculatis; ovario externo unico, magno.

Habitat.—Berwick bay.

Description.—Body and tail distinctly separate from each other, of ten segments, the first the largest, the last terminating in two short lobes from which issue two long setæ, more than half the length of the body, and two others about half the length of the former. First segment furnished with a short beak. Antennæ very distinctly forked, consisting of about seven or eight articulations. Fork taking place at fourth articulation—upper limb not articulated, longer than lower limb, which is divided into three or four articulations. Each articulation throws upwards and forwards a tuft of short setæ. Antennules of two joints, the latter terminating in three or four pretty long setæ. Mandibles were not seen. Hands of two articulations and a curved hook pointing upwards, as in *minutus.* Thoracic or first pair of feet (Fig. 28) have the superior or external stalk the longer of the two, of two joints, first short, second longer, having a strong tooth or process on inferior edge, and terminating in three or four short curved setæ or hooks. Inferior or internal stalk of three articulations; first short and thick; second longer and broad; third short and terminated by two pretty long straight setæ or hooks, and five or six curved ones, each gradually becoming shorter than the others. Abdominal legs as in the other species above-mentioned. Fulcra or supports have the appendage or finger in the form of a long, slender, slightly curved stalk, toothed or serrated on the upper edge, and terminating in three or four hairs. The external ovary is single, large, and generally lying across the tail, in consequence of which perhaps the insect generally swims prone or supine, seldom swimming on lateral surface, as most of the other species do. I have only met with three or four specimens of this species, all females; and in two or three of these, there was attached to the dorsal surface of the fourth segment of the body, a substance very much resembling a polype (Fig. 26,) consisting of a pedicle and three branches, each branch terminated by four short fingers.

7. *Cyclops depressus.* Plate X. fig. 9–12.—*Nova species.*—*Specific Character.* Corpore lati-depresso; antennis brevibus; cauda biloba, setis duobus brevissimis instructa.

Habitat. Berwick bay.

Description.—Body depressed, flat and broad, differing in this respect very much from all the other species described; of four segments, the first of which is much the largest, being more than equal to the three succeeding ones, and having the upper part projecting in a short obtuse point; tail about one-third the length of the body, terminating in two very small lobes, from which issue two very short setæ. Eye situated rather lower down than usual in the other species, of a fine ruby colour. Antennæ short, strong, subcylindrical, setiferous, of about six articulations; in the female having a lateral ring at junction of fourth and fifth; swelling in the male, (Fig. 10) situate in the fourth, followed by the usual hinge-joint, and terminating in a hook. Antennules of two articulations, the latter being terminated by about four short setæ. From opaqueness of body and flat form, I could not distinctly perceive the mandibles or hands, except that the latter were terminated by a curved hook as in *minutus*, *&c.* Thoracic pair of feet consist of two stalks as usual, rising from one common base, each stalk consisting of three distinct joints, (Fig. 11.) Superior or external stalk longer than inferior one, the last joint terminating in four short hooks. Inferior stalk terminated by several short setæ, and having a long seta given off at each joint. Abdominal legs, of the same form and structure as in the other species, and provided with numerous long hairs or setæ. Sexual organ of male? (Fig. 12,) very large, consisting of a broad plate issuing from junction of first with second segment of tail, terminating in a pretty long, bluntish, hollow spine, and having four short teeth or hollow spines on outer edge; the whole organ being nearly of an equal length with the tail. In the female the fulcra or supports issue from same place, and so nearly resemble the male organ as to make them appear the same. They are not so broad, however, and have only two lateral teeth, both of which are situate near the base. In the female the second segment of tail is much larger than in male.

The posterior two-thirds of thoracic segment is marked with a broad fascia of a very dark colour, with a ruby tinge in it. Two upper segments of tail are marked in the same manner, but not of so deep a colour. I have met with but few specimens of this very pretty species, and never with a female with ova.

The motion of this insect is peculiar. It generally swims on its back, and instead of darting *forward* through the water, as the other species of Cyclops do, it springs with a bound from the bottom of the vessel where it rests when undisturbed, *up to the surface* of the water. For this purpose it curls its body up into the form of a ball, and then suddenly returning to the straight position, springs with a sudden bound from the bottom to the surface, falling gradually down again to the same place from which it sprung.

I have noticed one or two other marine species of *Cyclops* on the coast of Berwickshire, but not having correct sketches of them, I shall not take notice of them here.

(To be continued.)

Explanation of Plates.—Plate VIII. Fig. 1, female of *C. quadricornis*, var. *viridis*, lateral view, (*a*) body; (*b*) tail; (*c, c*) antennæ; (*d, d*) antennules; (*e, e*) feet; (*f, f*) plumose setæ of tail; Fig. 2 (*a, a*) antennæ of male, to shew the peculiar swelling and hinge-joint; Fig. 3, tail of var. *albidus*, to shew the external ovaries; Fig. 4, internal mandible, (*a*) body; (*b*) neck; (*c*) " barbillon;" Fig. 5, external mandible; Fig. 6, hand; (*a*) internal portion, or thumb; (*b*) external do; Fig. 7, feet, first pair; Fig. 8, ovum at maturity; Fig. 9, young, a few hours after birth; Fig. 10, young, eight days old; Fig. 11, young, fifteen days old; Fig. 12, young after first moulting; Fig. 13, tail of male, to shew organs of generation; Fig. 14, female of var. *rubens*, to shew internal ovaries.

Plate IX. Fig. 1, female of *C. minutus*; (*a, a*) antennæ; Fig. 2, male of do; (*a, a*) antennæ; Fig. 3, antennæ of female; Fig. 4, do of male; Fig. 5, antennule; Fig. 6, mandible; Fig. 7, " barbillon" of lips; Fig. 8, hand; Fig. 9. thoracic or first pair of feet; (*a*) external stalk; (*b*) internal do; Fig. 10, second pair of feet; Fig. 11, fulcrum or support; Fig. 12, young just born; Fig. 13, young. eight days old (in October); Fig. 14, do. fifteen days old (October) Fig. 15, female of *C. chelifer*; Fig. 16, antennæ of female; Fig. 17, antennule; Fig. 18, hand; Fig. 19, thoracic or first pair of feet; Fig. 20, second pair of feet; Fig. 21, fulcrum or support; Fig. 22, male antenna; Fig. 23, female of *C. Stromii*; Fig. 24, first pair of feet; Fig. 25, antenna of male; Fig. 26, female of *C. furcatus*, in supine position, shewing external ovary and polype like body; Fig. 27, do. lateral view to shew its various members; Fig. 28, first pair of feet.

Plate X. Fig. 1, *C. castor*; Fig. 2, antennules; Fig. 3, internal mandible; Fig. 4, barbillon of lips; Fig. 5, hand; Fig. 6, feet, first pair; Fig. 7, male organs; Fig. 8, fulcra or supports; Fig. 9, female of *C. depressus*; Fig. 10, male of do; Fig. 11, thoracic or first pair of feet; Fig. 12, male sexual organ.

II.—*Observations on the Germination of Ferns.* By Mr J. HENDERSON. Plates XI. XII.

THE first account of the germination and raising of ferns from sporules was given by Mr Lindsay, in a paper read before the Linnæan Society, January 3d, 1792, and published in 1794 in Linn. Trans.

Vol. ii, p. 93. As far as it goes it is tolerably correct, but the figures are very rude and incomplete, and the process of germination is not progressively followed up to the developement of the first gyrate frond, when the young plant first assumes the peculiar habit of its order.

In 1819 a letter from Sir James Smith was read before the Horticultural Society of London, describing a method of raising ferns from seed (as it is termed) practised by Mr Henry Shepherd of Liverpool, and the principle then recommended by him has been found so successful, that if good seed* can be obtained, a crop of seedling ferns are raised with as much certainty, as one of any other plants.

In 1824, a paper on the germination of ferns by the Rev. John Macvicar of Dundee, was read before the Royal Society of Edinburgh, and published in the 10th vol. of the Transactions in 1826. A more minute account of the developement of the sporule, and more correct figures are given, but the investigation stops at the same point as that to which Mr Lindsay carried his observations.

Figures are given also by Agardh† in his Lehrbuch der Botanik, t. 3 f, 40–42; and the mode of developement of the first gyrate frond, which is incorrectly represented by Mr Lindsay and Mr Macvicar, is roughly, but accurately, delineated. Indeed the analogy between the young fern at that particular point of its growth, and a germinating endogenous plant appears to be now well known.

I have not, however, at present seen any thing like complete and satisfactory figures of these plants during every stage of germination, and as the subject appears to be one likely to lead to very important inferences ‡ with regard to the intimate structure, as well of the more highly organized plants, as of those which are merely cellular, the present observations, which have not however, any pretensions to novelty, except the existence of an integument§ in the sporule be a new fact, will not, I trust, be deemed superfluous.

---

* The word seed is here used in a practical sense only. The notion of Agardh, that the organ commonly called the capsule with its ring, is a seed with a prominent raphe, containing many embryos, is perfectly untenable.

† I have to acknowledge the assistance of a friend in pointing out this, and some other references to which I could not otherwise have had access.

‡ The developement of the fronds in full-grown ferns appears to me highly worthy of consideration. In Asplenium nidus, Aspidium fraxinifolium, Adiantum reniforme, &c. the younger portion of the frond is nearly transparent, and affords an opportunity of examining the manner in which the parenchyma is formed.

§ If I mistake not there is an integument of a very peculiar structure in the sporules of Equisetaceæ. If this be found to be the case generally with sporules, the analogy between them and pollen grains will be very striking, and the supposition, that they are mere modifications of the cellules, greatly strengthened.

Before describing the process of germination minutely, it may be as well to give a few practical directions, the result of some attention to the culture of ferns, for the guidance of any one who may feel inclined to verify these observations.

In the early stage of vegetation ferns are so exceedingly delicate in structure, and so liable, from the simple nature of their organization, to be affected by atmospheric changes, that it has been found necessary, even in a hot-house, in order to preserve a uniformly moist atmosphere, to keep the seed-pots under hand-glasses, until the seedlings have acquired strength enough to bear exposure without injury: by this simple contrivance, plants which could not be propagated by any other means are now increased to any extent.

The sporules will vegetate on almost any kind of soil when treated in this way: I have had them vegetate on the surface of a piece of glass made to fit on the stage of a microscope, for the purpose of observation, and this is by far the best method of observing them in the act of germination. But if the object is to continue the observations until a gyrate frond is developed, attention must be paid to the nature of the soil on which the seed is to be sown.

Perhaps the best soil to use would be a mixture of peat (in which there is a natural admixture of sharp sand) and a small quantity of loam; and if this cannot be procured, such a mixture as the following will be found to answer very well, namely, three parts of peat, two of sand, one of loam, and one of finely pounded potsherds, the whole mixed and passed through a fine sieve.

About a third of the pot in which it is intended to sow the seeds should be filled with potsherds for draining, and the rest, to within a quarter of an inch of the brim, is filled with the mould, pressed down a little, and watered several times with a very fine rose, until the surface is perfectly smooth, and the soil saturated with water.

The seed is then sown, and the pot placed under a hand-glass. Some cultivators place the seed-pots in pans filled with water, but where the soil is apt to generate minute algæ, such a practice is better avoided. I prefer having a hand-glass large enough entirely to cover the pot, under which there is a uniformly moist atmosphere, and the soil not being so thoroughly soaked with wet, is much less subject to be overspread with Conferva vaginata, Palmellæ, &c. which are so destructive to the seedling ferns. If the glass is kept close, which it should be for a time, very little water will be required, but when it becomes necessary, it should be given from a pot with a very fine rose, (the holes of which should not be larger than just to admit the point of a very small pin) with great care, and this should be repeated whenever the surface of the pot begins to get dry, particular care being taken to sprinkle the water evenly, and not to inundate the pot: a little should be given at a time, allowing it to be absorbed by the soil before it is repeated, and if possible it would be better to use only rain water.

In sowing the seed, if it has been recently gathered, it will be necessary to avoid sowing too much, a very small quantity will suffice to sow a pot, merely a thin dusting spread regularly over the surface. As the seed is extremely minute, the error of sowing too much is more easily committed than avoided, but it should be guarded against, as the seedlings are more likely to succeed if only a moderate crop, than when thickly crowded; the seeds of ferns, however, like the seeds of other plants, are apt to lose their vegetating qualities with age, and if the seed has been gathered a year or two, it will be necessary to sow it thicker.

Due attention must be paid to the state of moisture on the surface of the mould, after the seeds are sown, to guard against such an excess of it as will cause mould or any minute algæ to grow, keeping just such a state of humidity as will supply the absorbent wants of the seedlings.

As soon as the lobes of the seedlings begin to widen and assume a determinate shape, the hand-glass may be tilted up, and a little air admitted, and this may be increased from time to time until the plants can bear exposure; if they are too much crowded, they may be successfully thinned out, and the thinnings transferred to another pot: and it must be observed that the glasses should be shaded during very bright sunny weather, or placed under the shade of other plants.

These directions will sufficiently enable any one to repeat the observations on the germination and primary vegetation of ferns to which the following remarks refer. The sporules of the different sorts of ferns vary much in the time they take to germinate after they have been committed to the earth; some will appear in eight or ten days, while others will not be discernible in less than a month. In consequence of their extreme minuteness it will require a high magnifying power to enable any one to observe them during that process.

The first trace of germination is indicated by the appearance of a number of exceedingly minute green specks on the surface of the mould; if one of these is placed under a microscope it will be found that the sporule has burst open into two nearly equal halves, and a small greenish body occupies the lacerated orifice. This is, as far as I can ascertain, a single cellule, the inert body which was contained in the sporule called into life. The sporule is therefore composed of two parts, namely, the external integument and the internal cellule. The latter swelling beyond the capacity of the former bursts it open, and is then elongated a little beyond the ruptured edges of the integument. From the anterior apex of this primordial cellule, another is emitted generally of a spheroidal form, and about the same time an exceedingly minute pellucid fibril is emitted from its posterior end.

The first indication of the formation of a new cellule is the emission of a small ovate body from the anterior end of the previously formed one: at first it is almost colourless, and appears like a mere exudation of sap; as it advances, its almost liquid surface is gradually changed into a greenish pellicle, and the cellule then swells into a spheroidal form; but this form is very soon altered, when in its turn it has protruded a new cellule. This last, originating on the convex apex of the preceding, (from which it appears to draw the liquid necessary to its own formation) is during its enlargement gradually drawn closer and closer to the other, the convex end of which finally becomes concave as the two surfaces approximate and form the partition between one cellule and another.

The manner in which the cellules increase varies in different species. In some a single cellule is emitted from the primordial one, and from the end of that another, and so on to the amount of four or five before any lateral increase takes place. They then begin to increase rapidly to the right and left, ultimately forming two roundish lobes, with a deep intermediate sinus. As the cellules are added, delicate fibrils issue here and there from their lower surfaces, at or near their union with one another, taking a downward direction, and finally insinuating themselves into the pores of the soil. The lobes continue to increase externally until they have attained a certain size, when all external increase ceases; the primary frond* is then composed of a single lamina of cellules, which diminish in size from the centre to the circumference, and in appearance very much resembles the thallus or lobed frond of some Hepaticæ.

But this is only one of the forms which the primary frond assumes. Some increase more rapidly at first, and soon acquire a circular or reniform shape, increasing by the addition of cellules at the circumference; others divide into a number of lobes, standing nearly upright; while some produce one lobe after another, the lobes being recumbent, one lapping over the other. Some again have both surfaces covered with minute pedicellate glands, while in others the glands are only found on one side of the frond, and some, as the different species of Adiantum, are perfectly smooth and naked.

---

* This term is used because I can find no one given by botanists applicable to this state in ferns.

When the lobes have attained a certain size, external increase ceases. A slight swelling may sometimes be perceived of the cellules lying at the bottom of the sinus, and between the bases of the two lobes, which are of a large size; from the lower surface of the space composed of these cellules, a number of small fibrils are sent out, which penetrate a short distance into the soil, and supply the whole cellular body with nourishment. They are most numerous under what may be termed the base of the primary frond, namely, where the lamina first begins to widen; and between this and the bottom of the sinus, is the space on which the little knot of cellular matter is elaborated, in which the first gyrate frond and the radicle originate.

The process by which this is produced consists, in the first instance, in the emission from the lower surface of the above-mentioned cellules of a number of others; generally much larger in size, of an hemispherical form, and proceeding at right angles to the plane of the cellules on which they originate. These arise very near to one another, and soon unite into a confluent mass, forming a thick coating on the surface of the other cellules. From this coating others are protruded, which in like manner become confluent, and this cellular mass, tapering as it accumulates, terminates in a blunt or rounded point.

Previous to the developement of the frond and radicle, a farther accumulation takes place at the summit of the cellular knot, which now begins to swell out at two opposite points. The form of the knots varies in different species. In some it is round or hemispherical; in others nearly flat, and even hollow, in which case the cellular swelling is on the upper surface (sometimes but very rarely the knot itself is produced on the upper surface;) some again are surrounded by short detached filamentous processes, originating on their surface, and composed of elongated almost colourless cellules. These are the incipient paleæ or scales which surround the caudex of some ferns in a more advanced state; in some species, indeed, they assume the characters of flat tapering incurvate membranous paleæ even before the gyrate frond is developed.

There is a remarkable similarity in the appearance of the cellular knot at this stage of its growth, to the formation of the gemmæ or buds produced in the axillæ of the leaflets, and on the surface and the margin of the fronds of some ferns, such as Polypodium proliferum, Asplenium viviparum, &c. In the latter case, however, several fronds are developed before any root appears, but in the former the first gyrate frond is almost uniformly preceded by a root.

The production of the important body above alluded to, is the ultimate end and effort of the primary frond, and as it is the point at which gyrate developement commences, it may be regarded in the light of an incipient caudex. When it is matured, according to some one of the various forms which it assumes in different species, a root is protruded from one side of it, and soon after a small gyrate frond emerges from its summit, which when developed occupies the edge of the cellular knot, having the base of its stipe placed directly over the base of the radicle. This last immediately descends into the earth, while the former rising from under the primary frond opens out into a small simple or lobed leaflet. When this is matured, another is sent out, and the same process is repeated, a new root being in general added with each successive frond. The cellular mass in the meantime accumulates, and is gradually converted into a central caudex. The primary frond having completed its office withers and decays, while the characters of the perfect fern become more and more apparent, as one frond succeeds to another.

I have now traced the progress of this primary state of vegetation from its origin to the point where it passes into the mature plant, and in the magnified representations, some assistance will be given towards forming an idea of the actual appearance which it assumes at different periods.

It will be evident from what has been said, that the reproductive organs here have no affinity whatever with those existing in Phænogamous plants. There is here no seed in the proper sense of the word, no cotyledon, and no embryo.

The likeness which exists between the germination of ferns and endogenous plants is one merely of analogy, for there is no real resemblance in their mode of reproduction. In the one case the embryo is already formed within the seed ; in the other, as it should appear, a single cellule with a proper integument gives origin, cell by cell, to an expansion of cellular tissue bearing no resemblance to the perfect plant, which at length produces from a knot at a particular point, a frond and root bearing a strong resemblance to an endogenous plant when germinating. The real relation then of the germination to what takes place in endogenous plants appears to be, not to the germination of the seed, but to the propagation from the *edges or disc*, of the leaves from the cellular tissue, as in Baryophyllum calycinum, Malaxis paludosa, and a species of Ornithogalum observed by Turpin. And the inference is perfectly convincing that in ferns (and the mode of reproduction is the same in mosses and Equiseta) there is no impregnation ; and if this be true of the plants just mentioned, the argument will be so much the stronger as regards the lower cellular plants.

List of References, Plates XI. XII.

1. Nephrodium marginale 10 days after sowing ; *b, b,* more highly magnified, shewing the separation of the integument into two halves ; *c, c, c,* Gymnogramma rufa 19 days after sowing.
2. Nephrodium marginale after 16 days, *b* the same much magnified.
3. ———————— 22 days, *b* much magnified.
4. ———————— 4 weeks and 3 days.
5. ———————— 6 weeks and 2 days.
6. ———————— 2 months.
7. ———————— 5 months.

4, 5, 6, and 7 are magnified considerably: the latter has attained its full size, and is on the point of producing the first gyrate frond. In all cases, the first formed cellules either decay or are drawn under the earth by the fibrils, before the primary frond arrives at the state of No. 7.

8. A portion of a lobe of Gymnogramma chrysophylla highly magnified, exhibiting the manner in which the cellules are connected.
9. Lower surface of part of a primary frond considerably magnified, with the large cellules which form the basis of the cellular knot.

10, 11. Asplenium monanthemum, lower surface, showing the position of the cellular knot.

12. A reniform primary-frond of an unnamed fern.
13. Pteris nemoralis with the radicle protruded, and the first gyrate frond partly developed.
14. A portion of the primary frond of Pteris nemoralis, more highly magnified, the lobes folded back, showing the position of the gyrate frond and root on the cellular knot, and its attachment to the primary frond.
15. Aspidium fraxinifolium, the first gyrate frond fully developed.
16. Gymnogramma tartarea, the first gyrate frond a palmate or lobed leaflet, the second arising from its base.
17. Asplenium monanthemum, the first gyrate frond a simple leaflet, the second partly developed, lobed at the apex.

18, 19, 20. Portions of the primary-fronds of three species of ferns, exhibiting the progress of the cellular knot.

21. Gymnogramma chrysophylla, 22. Nephrodium molle, 23. Adiantum cuneatum, 24. Gymnogramma tartarea, 25. Pteris serrulata.	natural size.

III.—*Observations on the process of Exuviation in the Common Crab* (*Cancer pagurus*, Linn.) By JONATHAN COUCH, F. L. S.

IN a former paper, inserted in the Magazine of Zoology and Botany for August, (p. 170,) it is shewn that the manner in which the lobster disengages itself from its shell is different from that of the prawn and river crayfish. I will now proceed to describe so much as I have been able to observe, of the manner in which the same natural process is effected in the common crab, Cancer pagurus, Linn. and Leach; and which will be found to differ from what has been witnessed in any of the (~~Brachiu~~ri) long-tailed species, thus rendering it probable that great diversity may exist in the remaining families of the great order of Crustaceans; in none of which have any of the particulars been hitherto observed.

It is necessary, however, to premise, that I do not know how much of novelty my account may be found to possess; the only work on the subject that is within my reach being Dr M. Edwards's recent and hitherto unfinished History of the Crustaceans, already referred to. This author makes a slight reference to some papers by Mr Collinson, in the Philosophical Transactions, on the exuviation of the common crab; but, being unprovided with these works, I can only conclude concerning them, that they do not contain anything to supersede my remarks, since otherwise this learned naturalist would not have failed to have extracted their substance; and I am confirmed in this opinion by the fact, that in some late works on physiology, of deservedly high reputation, what is given on this subject is meagre and inaccurate.

When about to throw off its exuviæ the crab commonly retires to some secret place, in the near neighbourhood of rocks that will afford it shelter when unable to escape from danger, or defend itself from enemies. Its craving appetite seems also at this time to be suspended; but the particular subject of my observation differed from others, in wandering into a crab-pot at this period, in search of food; and being known by the fishermen to be what is called *peel*, that is, about to throw off its crust, it was transferred to the safe custody of the store-pot, on Saturday, July 30th, where, on the morning of August 1, it was found just then delivered from its covering.

As quickly as possible, and without injury, the living crab and its empty representative were brought to me: and the following is a description of the exuviæ.

The longest diameter of the carapace was 6¾ inches; compass of the largest chela, and length of the flap or tail, severally 3¾ inches: the individual a female, or what is termed by fishermen a Bon Crab. The carapace was sound, except on its under surface, where in its ordinary state a curved line passes backward from the jaws to the hinder part of the body. When caught on the 30th this portion was observed by the fisherman to be loosened; and now the portion included between this waved line and the sternal plate, was entirely separate and fallen inward. The sheaths of the antennæ and palpi perfect; one eye gone, the other remaining. with the transparent covering perfect, the stalk loosely attached; the tail and all its appendages perfect; the sternal plate beginning to break across in the middle, leaving to each portion a pair of legs on each side; but this not being a complete or natural separation, may have been produced by the weight of the limbs alone, or the efforts of the animal. The chelæ and legs perfect in all their attachments, the membranes unbroken; and the flat bones which occupy the middle of the muscles and serve them for tendons or points of attachment for motion, were uninjured and fastened to each joint, their distant extremities hanging loosely in the cavity of the case of the limb. The coverings of the branchiæ were perfect to their minutest extremities; and beside the internal coat of the stomach, the whole internal skeleton of the animal was thrown off without fracture or displacement:—including the two motive bones or levers that pass through the middle of the body from the jaws, to be attached to the internal dorsal aspect of the carapace: where formerly attached, however, to the carapace they hung loose. The curious bony articulations of the grinding apparatus of the stomach, which renders the digestion of these Crustaceans analogous to the rumination of quadrupeds, together with the double crustaceous body (perhaps gland) at the pyloric orifice, and the whole of the bony crusts or chambers that receive the muscles which move the legs, were disengaged without displacement.

The living representative of this wonderful skeleton measured 7½ inches in its longest diameter, the compass of the largest chela, and length of the flap or tail, 4 inches; the weight 24½ ounces, being 5½ ounces less than an ordinary crab of the same dimensions, weighed with it for comparison. It was plump, having much the appearance of a lump of dough enclosed in a membrane; and it was also equally soft, with scarcely more power of motion; appearing sensitive only when pressed on the under surface of the carapace. The colour above was red, beneath a pale yellow, the flap purplish; the bristles on the legs fully formed, but soft, which is the more worthy of notice, as I have seen the Porcellana platycheles, in which villosity forms a conspicuous character, entirely naked when just escaped from the crust. On cutting open the legs and chelæ, the bony plates to which the muscles are attached, and which serve for tendons, were found as soft as wet parchment, and towards the extreme joints, could not be distinguished with certainty. On breaking off the largest chela at the joint where the animal is itself accustomed to separate it when injured, the usual membrane formed towards the body, and no discharge took place; but a watery fluid proceeded copiously from the surface towards the limb, which was thus soon left empty, speedily becoming capable of being blown up with air like a bladder. On proceeding to dissect the body a similar circumstance took place, the fluid running off in so large a quantity, that I regretted when too late, that I had not taken the precaution to have measured it. In a few minutes, the body had so sunk into one mass that I was unable to distinguish the separate parts. At the lower and inner part of each joint of the chelæ and legs, an opening remained, in the form of a slit; through which the flat central bony plate, found in the empty crust, had been withdrawn; which opening of course must be closed when the shell is finally consolidated.

It appears from close inspection, that the exuviæ of a lobster consists of the same parts as those of a crab; the whole internal skeleton and external surface of the branchiæ, with the osseous tendons of the muscles, having been rejected. But they are more distinctly ascertained in the latter species, from their greater firmness of texture; and I may add also in reference to myself, that a desire to preserve the specimen perfect, had in the former case prevented a very minute examination of the internal structure.

Having procured a crab that was beginning to show signs of a commencement of the process of exuviation, I found the limbs shrunk to three-fourths of what the shell could well contain; the soft contents of the points of the chelæ being diminished much more than the muscular structure. A greater diminution than this, however, takes place before the process of deliverance is accomplished; but all the vigilance that I have exerted has not enabled me to see the actual escape from the crust; which is usually left in some void place, often in a sandy basin, and, as several fishermen have informed me, always on its back; as the living specimen I have described is represented also to have been found in the store-pot.

The newly extricated crab has at first strength enough to crawl off to a place of safety, commonly beneath the shelter of a neighbouring crevice, of such limited dimensions at its entrance, that it seems surprizing it should ever be able to return from it, in its new state of growth. The first instinct of nature after securing a place of retreat, is to absorb, I suppose by swallowing it, as much fluid as will distend its organs and their common covering, now as flexible as velvet, to the full extent of their capacity; by which means the deposition of crustaceous particles is made according to the dimensions of its newly acquired bulk: which in the instance now described, that had arrived at the ordinary size of a female, and allowing for the thickness of the first crust, exceeded the former by at least an inch in its longest diameter, and in all its dimensions in the same proportion. In the early stages of growth, the increase of bulk at exuviation is, of course, much more considerable, in relative proportion. Some of these smaller specimens may be found passing through this natural process in every month of the year; but in some adult individuals, the same crust must continue for a long time, since I have seen one with oysters measuring two inches and a half in length, on the carapace; and in another, a muscle (mytilus) about an inch in length, attached by its byssus to a joint near the body.

Whether, as has been said, the rejected case forms a meal for its old inhabitant, on its first return to habits of activity, may well be questioned; though I have known an instance where one crab has devoured another, leaving nothing but the points of the legs, and a small portion of the carapace;—but in the analogous instance of a prawn, that had just thrown off its exuviæ, I have detected the source of the firmness of the new covering, in the presence of small shell-fish in its stomach. Under a lens, a minute trochus, perhaps the T. zizyphinus, and some specimens of an oval bivalve, were distinguishable. This is perhaps the only period of their lives when their food is of this kind, but its nature cannot often be ascertained, by the comminution it undergoes from the manner in which it is devoured, when the jaws have attained their firmness.

Polperro, 1836.

IV.—*Contributions to the Ichthyology of the Firth of Forth.* By RICHARD PARNELL, M. D.

No. II.—*The Tadpole Fish.*

THE object of this paper is to shew, that the Raniceps trifurcatus is by no means so rare a fish as naturalists in this country have supposed, and to point out some very important characters in it, which have escaped their attention.

That it is far from being a great rarity I appeal to the authority of Sir Thomas Brisbane, who affirms that he has often met with it on the west coast of Scotland, inhabiting small pools in company with the Pholis lævis and other kinds of blenny; to that of Dr Johnston, who has noticed its occurrence in Berwick Bay; to that of Mr Couch, as well as that of Mr Jago, as to its existence on the coast of Cornwall; to the frequent discovery of it in the Solway by the fishermen; (I myself found it once;) and to the fact of three specimens having been captured by myself in the Firth of Forth; besides Mr Handcock's discovery of it on the Northumberland coast, in May last. Perhaps the investigation of such species, the authenticity of which has been doubted, may be as profitable as the search after new ones, and may save much trouble and confusion to compilers in future.

In appearance this animal little resembles any of our British fishes as to shape or colour, and may well be compared, from its form, to a frog in the tadpole state, from which circumstance it appears to have derived the name of "tadpole fish."

At the origin of the lateral line are nine or ten small tubercles, which are not perceptible when the fish is recently taken; but when the skin is somewhat shrunk by exposure to the sun or open air, these gland-like bodies become very evident.

This appearance caused Dr Fleming to suppose that the Barbus minor of Jago was distinct from Pennant's trifurcated hake, and he described it in his work on British Animals as a new species, under the name of Raniceps Jago. Dr Fleming was unfortunately misled, probably owing to his never having seen the fish, nor perhaps was there then in Scotland a preserved specimen in existence to consult. This defect I have endeavoured to supply by presenting a perfect individual to the museum of the Royal Society of Edinburgh.

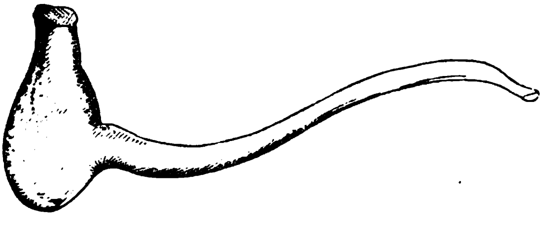
This affords an opportunity of observing how liable we are to be deceived when we do not examine specimens in a recent state, and how ready our zeal for discovering new objects is to hurry us into creating species out of imperfect descriptions.

It was not till after careful examination that I came to understand what these elevations on the origin of the lateral line were owing to. At first I imagined they were caused by the elevation of the scales, but by the assistance of a glass I observed these tubercles were not merely placed on the skin, but that they originated beneath the cuticle; while they appear to be small glands for secreting a thick mucus, with which the whole surface of the fish is covered.

The colour of the body is a dark sooty black; that of the lips, angle of the mouth, and under the gill-covers, of a pure white. The second dorsal, caudal, and anal fins, are of a deep black, with the upper margin of the two former shaded with white. The head is large and wide, a little more than one-third the length of the body, with the crown of it remarkably flattened and depressed; the anterior part of the body is round and tumid, while the hinder part is much compressed. On each jaw are a number of small sharp teeth, with a few long ones projecting beyond the rest, particularly on the lower jaw, and on the front of the upper; the anterior part of the roof of the mouth is also furnished with teeth set close together, and arranged in a lateral direction. At the commencement of the œsophagus are four cartilaginous prominences covered with a number of very small sharp teeth, rendering each rough to the touch. The tongue is broad, smooth, and destitute of teeth. The under jaw is the shorter, and furnished with a small conical barbule, placed on its anterior and under surface, which is scarcely perceptible except when the fish is in a recent state. Each eye is situated a little in advance of the angle of the mouth, and is of a pale yellow colour. Immediately over the base of the pectorals, the first dorsal fin commences, which is very small and easily overlooked, composed of three rays, of which the middle is the longest, being about half the length of the pectoral rays. The second dorsal fin commences in a vertical line over the middle of the pectorals, and runs down the back to within a very short distance of the tail. The anal fin begins in a line under the termination of the pectoral rays, and ends at a point not quite so far as that at which the dorsal terminates. The ventral fins arise under the throat, and the two first rays, which are the longest, and of a bluish-white colour, extend a little beyond the origin of the anal fin. The remainder of the rays are about one-third of the length of the two former, and of a dull black appearance. The caudal and pectoral fins are nearly of equal size and form, slightly rounded at the extremity; the latter is of a sooty black colour, with a broad light-coloured band running across the middle. The scales, which are small and very adherent, are scarcely perceptible when fresh. The air-bladder is large, with the coats thick and strong. The numbers of the fin-rays are,

1st D. 3; 2d D. 67; C. 20; A. 57; P. 17; V. 6.

The lateral line commences over the pectoral fin, and after running in a straight course half way down the sides, takes a sudden bend, thence continues straight to the tail. The œsophagus is short and wide; the stomach is of an oval form, and the intestines are entirely destitute of cœca. In this last respect the tadpole fish is an exception in the family *Gadidæ,* where the cœcal appendages are numerous, so as to form one of the principal characters of that family; and it is evident that Cuvier had not been acquainted with its anatomical structure, for had he been so he would not have placed this fish in the family in which it now stands. A new family ought to be constituted for it, in as much as it differs from the Gadi in having the head covered with scales, as well as in having the intestines free from cœca.



The habits of the tadpole fish are little known, because it lives in a situation where it cannot be observed, and so becomes the subject of examination only when it is removed out of its natural element, or after the death of the animal itself. It spawns in April, and feeds on small insects.

V.—*Observations on the Raptores of South America.* Translated from " Voyages dans l'Amerique Meridionale, par M. Alcide D. D'Orbigny."

The comparative distribution of birds of prey on the old and new continents assigns to the former the vultures, properly so called, and to the latter, the carunculated vultures, or Sarcoramphi. Among the latter, the king of the vultures appears exclusively stationed between the parallels of the tropics, or passes but a short way beyond them, frequenting only woody and warm situations; while the condor, which was held in such consideration by the ancient Incas, frequents the regions of ice and snow, and is by no means exclusively confined to the Andes, as has been hitherto supposed, but is likewise found in cold and undulated tracts, from the south of Patagonia to the line. In this last locality, it occurs successively at all heights, from the level of the sea, where a suffocating heat prevails, to the highest peaks of the Andes, in places where no other living being can resist the rarifaction of the air. Of all known birds, the condor is certainly the one that has the highest flight; and it is probably to this circumstance that it owes the rank near the sun which seems to be assigned to it among the Aymaras and Incas, as the being which made the nearest approach to it. The Cathartes all belong to America, where they inhabit all heights and latitudes (without, however, rising to the same elevation as the condor,) from the frozen regions of the south pole to the equinoctial zone. They live both on the plains and mountains, and even by the abjection of their manners, render an important service to certain towns, by removing the impurities allowed to accumulate by the negligence of the inhabitants. The remainder of the series of vultures of Linnæus belong to the old world.

We conceive, that we ought to separate from the series of the *Accipitres,* forming the genus Falco of Linnæus, with a view to form them into a sub-family of the Falconidæ, certain species belonging exclusively to America, viz. the Caracara * of Azara and Cuvier, and the Rancanca† of Vieillot, characterized by the disgusting manners of the vultures. They live for the most part on dead and putrid animals, or excrements, which leads them, like the cathartes, to approach inhabited places, and to migrate along with the wandering and savage hordes of the American plains. These birds have been distributed through different genera by that judicious observer, Don Felix de Azara, without regard to the similarity of their manners.

Then comes an extensive series of birds spread over the two hemispheres, the Eagles or ignoble birds of prey of Cuvier ; of these the " *Rostrames*"‡ of Lesson first present themselves, which are found only in America, in inundated places, where they go in large troops, employing their singular beak, and disproportionately long claws, to lay hold of fishes. Among the " *Pygargues,*"§ America has likewise its peculiar species. The aguia of Azara (*Falco aguia,* Temm.) is everywhere spread over the cold and temperate regions, frequenting the shores of the sea and the banks of rivers, where it replaces our osprey and sea eagle. The Circaëti, birds nearly allied to our own *Circaëtus gallicus,* Vieill., are also found in both continents ; and the only species of large size occurring in South America (*Circaëtus coronatus,* Temm.) is also the only one which braves the pestilential gales of the southern regions which it frequents.

The sanguinary harpy (*Harpyia destructor,* Sw.) which is confined to the numerous warm and humid forests of the American Torrid Zone, is perhaps the most powerful predatory bird occurring in these regions, and is most destructive to the peaceable monkeys, which are sometimes the sole inhabitants of these silent forests. The eagle-hawks (*Spizaëtus,*) inhabit both continents. Those of America frequent countries intersected with woods, and also plains and marshes ; even the urubitinga ‖ may properly be considered as a marsh bird. The gos-hawks and sparrow-hawks (*Astur* and *Accipiter*) likewise appertain to both continents. In America, their principal resort is woods and wooded mountains ; and they are most abundant in all the countries of the southern continent. The kites (sub-genus *Nauclerus*, Vigors, and *Elanus*, Sauvigny,) are from America and Africa; those of the first sub-genus, at least the *Nauclerus furcatus*, Vig. hovers for whole days over the surface of lakes and marshes. The buzzards (*Buteo*) are also common to the two worlds; but we believe them to be much more numerous in America than in Europe, and even than in Africa, the greater extent of marshes and plains, occasionally tufted with woods, being highly favourable to their mode of life. They are found in all latitudes, from Patagonia to the equator, and from the level of the sea to a very great height on the Andes. The same thing may be said of the harriers (*Circus*) which, pretty nearly allied by their manners, are likewise widely diffused in America, but occur only in woody plains.

---

* *Polyborus,* Vieill. † Ibycter, Vieill. ‡ Cymindis. § Haliæetus.

‖ Falco urubitinga, Linn. Lath.

The Falconidæ inhabit both continents, but are much less numerous in species in the new than in the old world. They are migratory birds, not more fierce than our European kestril, but extremely well adapted for the chase. After the conquest, they were employed for hunting tinamous; and it is not long since they were used in Peru and Bolivia for the same purpose.

The nocturnal birds of prey, or Strixidæ, included in the Linnean genus *Strix*, which have with propriety been formed into a tribe distinct from the other rapacious birds, are equally spread over both continents. Such relations exist between the European owl (*Strix flammea*) and its analogue in America, that it would be difficult to say exactly whether these species are not identical. The American owls are equally fitted with those of Europe to inspire alarm in the timid. They live in inhabited places, in old houses or churches, and among rocks in the deserts, occupying all latitudes and elevations. The barred Eagle-owl (St. Virginiana, Gm.?) is found only in the forests of the temperate regions of South America, under all latitudes, representing our large Eagle-owl, (Bubo maximus, Sibb.) of France. The "Cheveches"[*] (*Noctua*, Savig.) which abound on both continents, occur in like manner under the most different latitudes, and from the shore of the sea to 17,000 French feet above it. All these are noisy birds, and they impart an additional gloom by their melancholy accents, to the vast solitudes which everywhere surround the traveller in South America. There are two species which never approach wooded places, but alight in the immense savannahs, or the arid summits of mountains, and one of them occasionally lurks in the burrows formed by mammiferous animals.[†] *Scops* belongs to the warm and temperate regions of the two continents.

---

[*] "Le type du genre *Chevèche* est le *Strix Nyctea*, Gm." Less. Mon. d'Orn. i. 100.

[†] Perhaps the Ulula cunicularia, Feuill.

By the preceding generalities, it will be seen that almost all the groups of predatory birds are common to the old world and to the new.

To recapitulate, we may state, that the only genera belonging exclusively to America, are, among the vultures, the Sarcoramphi and Cathartes, replacing in this quarter of the world the true vultures, which are peculiar to our own hemisphere; among the Falconidæ the small group of Caracaras, which have no analogues in the old world, and which differ from the vultures only in their forms, for their manners really connect them with that genus. The harpy* and the rostrame† are likewise birds exclusively American, without any analogues in Europe; for none of our eagles are so strong as the harpy, and none of our birds so sociable as the rostrames.

Let us now consider the birds of prey with respect to their geographical distribution, or the number of species which the different localities of South America present to our notice.

We shall divide the whole extent of country to which our observations extend, into three zones; and these three zones shall each be considered in three points of view, namely, in regard to their latitude, their elevation above the level of the sea, and the nature of the countries which compose them.

Our *first* zone extends from the 11° of latitude to the 28°, and in elevation from 0 to 5000 French feet above the level of the sea; our *second*, from 28° to 34° of latitude, and from 5000 to 11,000 feet in height; our *third*, from 34° to 45° of latitude, and comprehends every elevation above 11,000 feet.

The *first zone of latitude*, (that which extends from the 11° to the 28°) besides its immense plains and forests, naturally comprehends the most elevated tracks of the Andes; it, therefore, possesses the greatest number of species; for, independently of such as are peculiar to the warm and temperate zone, we there find the kinds which inhabit a lower latitude, the proportional decrease of heat, as we ascend the plateau of the Andes, soon rendering the temperature of this latitude equal to that of the most southern. Thus when we regard in the aggregate all the species comprised within these two parallels, without taking into account the zones of elevation, we find them amount to thirty-eight, while the total number of species observed does not exceed forty-one. According to this calculation there will only remain for the two other latitudinal zones, three species not found in the first, and peculiar to the southern plains. This proportion will at first appear enormous, but the explanations on which we are about to enter will make it seem less extraordinary.

If we consider, in reference to this first zone, the species confined to an elevation from 0 to about 5000 feet above the level of the sea, as far as the 12th degree, an elevation of which we believe the mean temperature to be equivalent to that of four or five degrees of latitude without the tropics,—it will be seen, that there must be a deduction from the grand total, of all the species inhabiting this latitude only in consequence of the extreme height of the Andes. The number will thus be limited to twenty-eight, an amount which still approaches to two-thirds of all the species observed. At the same time the species differing, and peculiar to the second and third zones of elevation, give a minimum number of only ten, without including such as likewise inhabit a less elevated zone.

---

* Harpyia.

† Cymindis.

The *second zone of latitude* (from the 28th to 34th degree) by no means presents so many species as the first; but the diminution is gradual, consisting either of the half, if we include all the species found at every height of the latitudinal zone, or of a third only, if we limit the comparison to those of the zone properly so called; for we then find nineteen species, nine of which belong to the plains, and ten to the mountains. Here, therefore, it appears that the number of species is as great, or at least equal, on the mountains; while in the first zone of latitude, the birds of the plains were most numerous. Among these species, four only are proper to the plains, the rest being either alpine or of the third zone.

The *third zone of latitude*, (from the 34th to the 45th degree) comprehends the smallest number of species, for we have not found in it more than seventeen, all of them in the plains or slightly elevated tracks which stretch from the shores of the sea to the foot of the Cordilleras of Chili. The proportion is less than a third compared with the total amount of species in the first zone of latitude, and nearly a half viewed in reference to the number of species of the same zone of which we speak. Among the latter, eight are likewise found on the summits of the Andes, and nine are Patagonian, or frequent either the dry plains or sea shores of the zone.

Let us now consider the distribution of the birds of prey relatively to the height of their abodes, comparing at the same time the species of the zones of elevation with the species of the zones of latitude in regard to the most southern.

The *first zone of elevation* (from 0 to 5,000 French feet above the level of the sea) includes the species which, from the 27° of latitude for example, live always in the plains, but the difference of temperature is so inconsiderable, that all the species, at least such as are not confined to districts of a particular kind, occupy indifferently the lowest and the most elevated situations.

In the *second zone of elevation* (from 5,000 to 11,000 feet above the level of the sea) we find nine species, of which two only are confined to this region or its localities, the others also belonging to the second or third zone of latitude, where they live in plains where the temperature is nearly the same, and the surface of the country presenting neatly the same aspect as in the elevated zone. Such species have found, in the course of their migrations, regions analogous to those they inhabited in the southern plains.

The *third zone of elevation* (comprehending all heights exceeding 11,000 feet above the sea) presents nine species, among which there is only one Alpine bird, the others pertaining to Patagonia and the Pampas.

From the preceding observations it may be inferred that the birds of prey always follow the same law of geographical distribution as the other series of birds. It is even among them that we most frequently find in the third zone of elevation, or in the third zone of latitude, which corresponds to it, the reappearance of the same species, instead of merely an analogous species, as happens in some genera of the following orders.

The nature of the country must doubtless exercise much influence on the place of residence of every species. Such as range over the greatest extent of surface offer a proof of this. The condor, for example, which extends from the most southern countries as far as the line, never deviates in its migrations from the vicinity of dry and arid mountains; its appearance in Patagonia is owing to the attractions afforded by the high shores of the sea, the neighbouring mountains of San-Jose, and the analogous nature of the countries to those which are its appropriate abode. The same thing may be said of the Buteo tricolor, D'Orbig, and the Falco aguia, Temm. which belong in particular to mountainous localities. Certain species, however, are exempted from this influence, for the common caracara, and the two species of cathartes, inhabit indifferently, under all the zones, either plains or mountains, provided there exist, where trees are wanting, either bushes or cliffs of rock on which they may perch.

If we examine the distribution of the species in reference only to their particular localities, we will see, for example, that very few of them inhabit the large forests, and when they do so, it is only the outskirts, never the interior, as has been hitherto supposed. The districts which most abound in birds of prey, and which they love to frequent in preference to others, are those that are either slightly elevated, or rather entirely flat, with scattered tufts of wood, extensive marshes, and numerous natural waters, the banks of which are always wooded. Even the great Harpy, (*Harpyia* *destructor*, Sw.) which perhaps more than any other species may be considered a forest bird, always follows the banks of rivers.

By dividing all these birds into three classes, and considering the number of species which inhabit, *first*, the wooded lands which we have just described; *secondly*, the arid plains merely covered with small bushes; and *finally*, the mountains; the amount of species in the wooded plains will be thirty-three, that is, more than three-fourths of the whole species observed; in the arid plains it will be nineteen, that is, less than the half of that number, and sixteen, or rather more than a third, for the mountains. It will be understood that these numbers include the species which continually pass from one locality to another.

From all these observations it follows that the number of species decrease proportionally as we advance from the warm regions to the pole, or as we ascend from the low-lying lands of the tropics to the summit of the Andes: and nearly for the same reason, they likewise diminish in their passage from wooded tracks to plains, and from plains to mountains. The following little table affords, in a condensed form, a comparative scale of this system of decrease in the number of species.

ZONES.

No. of zones.	OF LATITUDE. (Scale of degrees)	No. of species.	OF ELEVATION. Above the level of the sea (to 15° of latitude.)	No. of species.	OF HABITATION. According to the nature of the country.	No. of species.
1st,	From 11° to 28°	28	From 0 to 5,000 feet.	28	Woody places, marshes, natural waters.	33
2d,	From 28° to 34°	19	From 5,000 to 11,000 f.	9	Arid & shrubby plains	19
3d,	From 34° to 45°	17	Upwards of 11,000 feet.	9	Elevated mountains	16

It may be asked why the greatest number of rapacious birds inhabit warm regions, and particularly places in which marshes occur and detached tufts of wood. The reason is, that the majority of South American birds of prey do not feed solely on small birds and quadrupeds, like the greater part of European species, but likewise on land and aquatic reptiles which abound in such situations, as well as on fishes and even insects. In America the falcons are the only Raptores which habitually pursue birds and mammiferæ; all the others eat animals of every description; a circumstance which made Azara [*] suppose that the American birds of prey might share the characteristic indolence of the inhabitants of this quarter of the world. They are in reality much less active than those of Europe, with the exception of the Falconidæ, which every where exhibit their characteristic vivacity. This, indeed, is easily accounted for from their mode of life, for they are obliged, more frequently than others, to perch at the margin of waters or on the outskirts of woods, in order to watch the egress of a frog, a lizard, or an insect, which they immediately seize and devour on the ground. They are therefore seldom seen hovering after the manner of our "Jean le Blanc,"* or our eagles; for even the Aguia Eagle and the Buzzards, which hover most, are observed to do so only for a short time in the day, especially in the morning.

---

[*] *Voyages dans l'Amérique Meridionale*, Tom. iii. p. 5.

We have noticed among many kinds of American birds of prey a sociable instinct wholly unknown to those of Europe, which, with the exception of vultures, never unite in flocks. The vultures of America are as sociable as those of Europe. They assemble in order to devour dead bodies; and the caracaras, their faithful imitators, congregate like them on the same carcases, with a like degree of familiarity and confidence; but in these associations the caracaras are probably more influenced by the desire of obtaining a kind of food common to both, than by any really sociable feelings. The case is different from those assemblies of birds of the same species belonging to other tribes, which move from one place to another in flocks, alight together on the margin of the same lake, perch on the same tree, or even the same bush, in the vicinity of waters and in wooded plains, and rarely separate, at least during their movements over the country; for we are yet ignorant whether they congregate for an annual migration. However this may be, the birds possessing this property are the Cymindis with hooked bills (genus *Rostramus*, Less.) which in this manner continue in company at least for three months in the year, as we assured ourselves by actual observation on the frontier of Paraguay.

The leaden coloured Buzzard (*Falco plumbeus,* Lath.) has the same habits. We have seen them in the skirts of woods resting in large flocks on the same dead tree for a whole day together, some of them pursuing birds and others reposing, the latter taking wing when their companions returned to their perch. It is surprising to meet with this social instinct among birds whose mode of life seems calculated to render them jealous, quarrelsome, and solitary: and, indeed, with the exceptions just mentioned, rapacious birds always live alone without experiencing any of that attraction which brings animals into companionship with others of their kind. Even in the season of love, these voracious birds scarcely remain together in pairs for more than two months, when they again separate and take no further notice of each other. It is true that, during this interval, in submission to the law which regulates every sentient being, they appear to become as loving as they are at other times fierce, and share with each other in the toil of rearing their nest; but from the moment the young are sufficiently strong to seek their own food, the couple separate, and appear as selfish and ferocious as before. The more carnivorous they are in their habits, the less does their mode of life dispose them to society; and on no occasion are they seen to live together during greater part of the year, as habitually takes place with many of the Incessores, the Gallinaceæ, Grallatores, and the Palmipedes.

---

* F. brachydactylus, Wolf.

Another kind of union, purely fortuitous, takes place in the immense savannahs of America. The inhabitants are accustomed to set fire to the fields every year, in order to renew the herbage. This conflagration proves destructive to a numerous host of peaceable creatures, which believe themselves secure in their rich plains, from the destructive talons of their mortal enemies. Small mammiferæ, reptiles, and innumerable insects flee in all haste, from these torrents of flame, beyond which myriads of rapacious birds, whose habits usually keep them remote from each other, but which a common instinct of voracity brings together for a short time on this theatre of destruction, are eagerly on the watch. The caracaras, in particular, more numerous, clamorous, and impatient than their companions, dart into the midst of the crackling flames and clouds of dense smoke, while the Buzzards, intimidated by the fire which the caracaras disregard, hover slowly round it in search of their prey, which is often audaciously carried off by the light falcon of more rapid flight, at the very moment they are about to seize it. Nothing can be more remarkable than this spontaneous assemblage of birds, advancing before the rapid progress of the flames, and eagerly disputing for some feeble victim, which already subdued and alarmed, escapes from one calamity only to be overwhelmed by another. When the fire has ceased, all the birds disperse, and each commences for itself a pursuit more easily followed but not less destructive. They run over the burned surface while yet covered with ashes, in order to seek out the half-burned carcases of reptiles and small mammalia, which were unable to escape from the flames; but now, resuming their natural character, they shun the approach of their kind, carrying off their prey in their talons, in order to devour it in some solitary spot, and even then, although entirely removed from their companions, they are seen to look around them from time to time with suspicion and fear, lest others should come to share their bloody feast,—an apprehension from which they are not freed till it be wholly consumed.

In a country where the greater number of birds of prey feed on reptiles and insects, it is curious to see birds belonging to other orders, likewise become carnivorous. Domestic birds are, for the most part, fed with flesh, of which hens and ducks are extremely fond, and it is not merely wild birds which leave grains and insects, their ordinary food, to feed on the flesh which the inhabitants hang out to dry in the sun. We have seen the finches, Icteri, and flycatchers search for this kind of food with a voracity and eagerness which are not natural to them in a wild state, and which can only be attributed to the extreme facility with which they procure it.

The partial comparisons which we have been able to make either of genera or species, show that in the old and new world birds of prey lay a similar number of eggs, and follow the same general mode of constructing their nests, and we do not hesitate to affirm that the markings of the eggs are of the same form, and are generally distributed in the same manner.

In their mode of walking, rapacious birds differ much among the different tribes. Thus the slow and measured pace of the caracaras and vultures distinguishes them well from the leaping of the falcons and buzzards. The birds of the two first series willingly alight on the ground; some of them remain there continually, perching only at intervals, and then upon rocks; while others, although occasionally observed walking, love to pass nearly their whole life in solitude upon trees.

The eagles and the falcons, for example, very rarely light on the ground. They advance to the object of their search by successive leaps: but most commonly they seize their prey on the wing, carry it off in their talons, and go to devour it at a distance. They remain only for a short time on the ground, resume their flight, and perch while digesting their food on the low or elevated branches of trees in the skirts of woods.

The manner of flight likewise differs much in the different tribes. Even among the vultures it varies so much that it would be difficult to assign it a general character. Most frequently, however, the flight is high, rapid at intervals, but rather slow for the greater part of the course. It is among the vultures, and not among the eagles, as Buffon supposed, that birds of the most lofty flight are to be found; for the condor disappears from the sight above the plateau of the Andes, at a point more than 2000 toises above the sea, and at least an equal height may be allowed from the point of its departure; an astonishing elevation, as will be admitted by every one, but which must appear still more extraordinary to an observer who becomes the victim of the rarefaction of the air in regions from 16,000 to 17,000 feet above the sea. Some other birds have a singular habit of whirling about in a particular spot, at a prodigious elevation, from which they allow themselves to drop down like a ball, making a noise like the whistling of an arrow flying through the air; on approaching the earth they again resume their usual flight. The vultures are in general (for a few species are exceptions to the rule) the only birds which hover at a very great height above the surface of the ground. Some kinds of eagles rise rather high into the air, but they continue there only a short time, preferring the more temperate regions. The buzzards hover in the same manner as the Falco brachydactylus, without, however, traversing a considerable extent of country before reposing, as they do in Europe, which is probably owing to the greater facility with which they obtain their prey. The rapacious birds, which in other quarters of the world are always distrustful, restless, and little accustomed to live in the vicinity of man, seem to shew a disposition to approach him in America. The Cathartes and the Caracaras are never seen in desert places, unless they are drawn thither by troops of large mammiferous animals, such as the Otariæ on the coast of Patagonia. These birds are become the faithful companions of the savage tribes in their migrations, and, as has been already mentioned, they are useful neighbours to the inhabitants of towns, who in some instances have framed special laws for their protection.

The Falconidæ are generally wilder; but some of the typical species take up their abodes in a house or a church, on the summit of which they are seen to alight for an instant, and then dart away to explore the neighbouring country, without appearing to be disturbed by the presence of man.

The Buzzards, and in general all the ignoble birds of Cuvier, or the Aquilinæ, are comparatively less sociable, always remaining at a distance from inhabited places, and even flying off at the first approach of the enemy of all animals, from natural instinct rather than any real apprehension. These birds, however, are much less fierce than the European species, which can be taken only by surprise; they fly to a much smaller distance from man; but the suspicious character peculiar to all carnivorous birds continually manifests itself in all the species of this series. The nocturnal birds of prey follow the same laws as those of Europe with respect to the instinct which leads them to approach our species. The owls of America, (that is, those constituting the modern genus Strix,) like our own, live in buildings, and in the midst of towns, while all the others conceal themselves in thickets during the day, from which they issue in the night to obtain an abundant supply of food in the recesses of the deserts.

We think that we have noticed in the case of certain American birds of prey, a much less striking disproportion between the size of the male and female, than in those of Europe; a disproportion sometimes so remarkable, that were they not seen paired, an observer might be tempted to consider them distinct species. This disproportion is particularly notable in *Nisus hemidactylus*, Temm. but in most of the other species, it is reduced almost to nothing, and in some instances entirely disappears. The falcons, properly so called, for example, and some buzzards, differ but very slightly in size. We have observed another modification of form in birds of prey, resulting from difference of age. We allude to the greater or less length of the tail in the young and the adult. It is well known that among passerine birds and the Gallinaceæ, for example, the young are entirely destitute of an ornament which is so conspicuous in the adult male; and reasoning from analogy, the tails of rapacious birds ought likewise to be much longer in the adult than in the young. Observation, however, has continually presented us with the contrary appearance, which may be regarded as a character peculiar to birds of prey; the fact being, that among them the tail of the young is always longer than in the adult, the only example of the kind occurring among birds.

A single observation will complete all that we have to offer of these general notices.

Buffon, not without some appearances to justify him, classed the Shrikes among birds of prey, because, although without many of the characters of the tribe, they partly resemble them in habits, since they eat flesh, and even sometimes kill small birds. Azara, on the other hand, thought he had a similar authority for placing the Toucans among birds of prey, because at one season of the year they seek for nests in order to devour the eggs and even young. With accurate views of these improper alliances, Cuvier detached the Shrikes and Toucans from the group of rapacious birds, as belonging to a different series, and reduced it to the subjects which rightly compose it, and which will probably always continue to belong to it. In these circumstances, we cannot fail to express our surprise at seeing our skilful colleague, M. Lesson, place the Cariama or Sariama in this group, merely because it eats reptiles and particularly serpents. May we not object to this arrangement, that the stork, as well as the Sariama inhabits lofty places, and feeds on serpents, although no one has ever thought that it should therefore be placed among the birds of prey? We have carefully studied the manners of the Sariama; and, not to mention its long naked legs, the want of hooked talons, and a beak very unlike that of birds of prey, we can assert that it certainly belongs to the series of Grallatores, of which it possesses all the characters, and among which it was formerly placed. The detailed description which we shall give of this species in its proper place, will satisfy every one as to the accuracy of this statement.

The following table presents the general division of birds of prey according to our ideas of it, restricted, of course, to the American species.

OISEAUX DE PROIE.	Ire Famille: VULTURIDEES. *Vultur*, Lin.		Sarcoramphes. Cathartes.
	IIe Famille: *Falconidees.* Falco, Lin.	1re Sous-famille: *Caracarides.*	Rancancas. Phalcobènes. Caracaras.
		2e Sous-famille: *Aquiléides,*	Rostrames. Circaëtes. Aigles-pecheurs. Harpies. Aigles-autours. Autours. Milans. Cymindis. Buses. Busards. Eperviers.
		3e Sous-famille: *Falconides.*	Falco.
	IIIe Famille: *Strixidées.* Strix, Lin.		Strix. Ducs. Chevèches. Scops.

VI.—*Characters and Descriptions of the Dipterous Insects indigenous to Britain.* By JAMES DUNCAN, M. W. S., &c. &c.—(Continued from p. 145.)

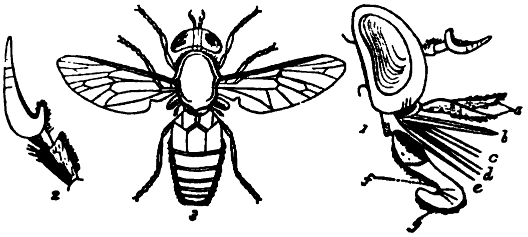
FAMILY TABANIDÆ.

ANTENNÆ porrected, approximating at the base, generally three-jointed, the third joint ringed, without any style or seta at the extremity; proboscis and palpi salient and conspicuous; abdomen consisting of seven segments; halteres half-covered by large winglets; wings extended horizontally on each side of the body; tarsi with three distinct pulvilli.

The insects of this family are well known for their blood-thirsty propensities, which instigate them not only to attack many of the larger quadrupeds, but even man himself. In this island they are happily not so numerous as in many other countries, but, owing to the prevalence of a few species, the annoyance they occasion to cattle is by no means inconsiderable. Of the six genera found in Europe, three only have hitherto been detected in Britain. These may easily be distinguished by the following modifications in the structure of the antennae.

Two lowest joints of the antennae somewhat cup-shaped and unequal; third joint	5-ringed	TABANUS.
	4-ringed	HÆMATOPOTA.
Two lowest joints of the antennae cylindrical and equal		CHRYSOPS.

GENUS TABANUS.



Antennae as long as the head, approximating at the base curved outwards anteriorly, three-jointed; first joint thick and cup-shaped, second, small and depressed, third, large and thick, imperfectly crescent-shaped at the base, and narrowing gradually to a point, the upper portion divided into four distinct rings, (Fig. 2;) trunk horizontal in the male, perpendicular in the female: palpi conspicuous and exserted, two-jointed, first joint short and clothed with long hairs, second capitate in the male, long and attenuated in the female, (Fig. I, *a*); labium large, fleshy, and cylindrical, terminating in two long hollow lobes, (Fig. 1. *g*.); labrum long, lanceolate, acute, (Fig. 1st. *b*.) mandibles and maxillæ (the latter wanting in the male,) lanceolate and slender (Fig. 1. *c*. and *d*.); tongue narrow and pointed, (Fig. 1 *e*.); head transverse, as broad as the thorax, rounded anteriorly, but flattened and somewhat concave behind, and attached to the thorax by a short slender neck: eyes contiguous in the male, a little remote in the female; the facettes largest on the upper side in the former sex: ocelli wanting; thorax ovate quadrate; abdomen inclining to conical in the male, wider and depressed in the female; wings half-open when at rest, furnished with three discoidal cells; winglets large and circular: tarsi with the radical joint longest, the pulvilli conspicuous, and distinctly three-lobed.

The Tabani are known in this country by the names of *Breeze* and *Horse-fly*. They appear to be the insects called *Œstrus* by the Greeks, and *Asilus* by the Romans, and are frequently alluded to under these names by the ancient poets on account of the terror they occasioned among cattle. They are of strong and robust forms, generally somewhat above the middle size, one of the species being the most bulky of the European Diptera. The prevailing colours are somewhat obscure, with the exception of the eyes, which are of great brilliancy, and often ornamented with rays and spots of crimson and purple. They first appear in the month of June, but are seldom in full force till the middle of autumn. They delight in warm and sultry weather; are most active on the wing during the heat of the day, and are therefore most troublesome to cattle and beasts of burden where they stand most in need of repose. They are particularly excited and eager for blood when the atmosphere is in a warm and humid state, such as it usually is after a thunder shower. It is invariably observed to be the females that attack animals, the males being usually found on flowers from which they extract the juices; [*] both sexes, indeed, have been known to feed on a saccharine liquid. The quantity of blood which they can gorge is much more considerable than might be supposed from the size of the body, as the latter, after a full meal, becomes dilated beyond its usual dimensions. Several of them attack indiscriminately many different kinds of the larger quadrupeds, especially the ruminants, but others, like the Œstri, more particularly attach themselves to certain species. Thus, the rein-deer has a winged parasite appropriated almost exclusively to itself; and it is not improbable that a more extensive knowledge of the history of these flies would make us acquainted with others equally restricted in the choice of their victims.

The oral organs of the Tabani are very highly developed, constituting an apparatus for extracting the blood, of a somewhat complex structure, but admirably adapted to the purpose. It resembles a case of lancets, having all the parts so formed and adjusted to each other, that they serve at the same time to pierce the skin, and to form a tube for the passage of the fluid. Although so dissimilar in shape, these parts are found to correspond in number and situation to the oral appendages of the Coleoptera. The concave lobes of the lip probably enable the insect to attach itself firmly, and to render the apparatus steady; while the palpi are useful in dividing the hair, and form a kind of protecting sheath for the other parts when they are unemployed. In substance the pieces are so stiff and horny, that they easily make their way through the hardest and coarsest hide.

These insects deposit their eggs in the earth. The larva of one of the species, (*T. bovinus*) has been figured and minutely described by De Geer. It is long, cylindrical, and rather slender, narrowing at the head into an elongated cone, and bearing much resemblance to those of some of the larger Tipulidæ which live in the earth.

1

2

3

---

[*] The same fact has been noticed in relation to the respective sexes of various *Culices*, and some other sanguisugous species.

The body is divided into twelve rings, the anal one being very minute and resembling a tubercle, (Fig. 1.) The head is provided with two short antennæ and several minute organs, among which the most conspicuous are two scaly hooks, which it employs in opening a passage for itself in the earth, and in aiding its motions. The latter, however, are chiefly accomplished by means of numerous retractile tubercles placed on a dark-coloured band encircling most of the segments, which, by their pressure against the plane of position, preserve the space gained by the elongation of the rings. With the exception of the bands just mentioned, the colour is dirty white, the head brown and shining. The pupa is nearly cylindrical, of a greyish-brown colour, the segments fringed on the posterior margins with grey hairs (Fig. 2.) The anal segment is small, and armed with six sharp scaly points, (Fig. 3.) which seem to enable the pupa to push its head above the surface of the soil, as it is always observed to do, while the lower portion remains imbedded.*

The species of this genus hitherto recorded as British, form but a small proportion of such as are known to inhabit corresponding latitudes on the continent, and it may therefore be expected that considerable additions will yet be made to them. Meigen describes forty-two.

TABANUS BOVINUS. (s.)

Tab. bovinus, *Linn. De Geer,* vi. 219. pl. 12, fig. 10 and 11; *Fabr. Meigen.* ii. p. 43. *Wood's Illus.* pl. 60.

Ground colour brownish-black; eyes brassy-green during life; antennae blackish at the tip, and inclining to ferruginous at the base; hypostome, forehead, and all the oral organs, except the labium, greyish-yellow: thorax with several depressions on the surface, clothed with yellowish-grey hairs, and having indistinct dark-coloured longitudinal stripes: scutellum and abdomen of the same colour as the thorax: hinder edge of the abdominal segments with a reddish-yellow band, variable in breadth, and a whitish triangular spot in the middle of each: under side covered with cinereous pubescence inclining to yellow, each abdominal segment with a rather large semicircular black spot in the centre, and a narrow oblique black line on each side of it: thighs and tarsi blackish: tibiæ yellowish-white, more or less dusky at the apex: wings brownish, the costal and discoidal nervures yellowish-brown; winglets and halteres brown. Length 10—12½, breadth 4—4¾ lines.

---

* De Geer, Vol. vi. 214.

This conspicuous insect, by far the most bulky of our native Diptera, is found occasionally in moorland and uncultivated districts, apparently in most parts of Britain. In Scotland it seems to be of more frequent occurrence in the Highlands than in the southern counties; although numerous specimens have been obtained from the latter. "Sutherlandshire," *James Wilson, Esq.* "Glen Clova," *H. C. Watson, Esq.* "Cardoness, Kirkcudbrightshire." "Monkswood, Hunts," *Charles C. Babington, Esq.* "Not uncommon in Cambridgeshire," *Rev. Leonard Jenyns.* "Ireland," *A. H. Haliday, Esq.*

TABANUS AUTUMNALIS.

Linn. Fabr.—Tab. bovinus, *Harris' Expos.* 27. pl. vii. fig. 1.; *Geoff.* ii. 460. pl. 17, fig. 2.; *Meig.* ii. 39.

Considerably less than the preceding, seldom exceeding eight or nine lines: hypostome and palpi light grey, the forehead of the female nearly white with a black line down the middle, dilated beneath into a shining callosity: antennæ black; eyes in the male with a dark line in the middle: thorax pretty thickly clothed with hairs, brownish-grey, with four dark brown longitudinal lines: abdomen greyish-white, with reddish brown reflexions in the male, the first segment brown, the others marked with four series of dark quadrate spots placed obliquely; underside of the abdomen light-grey, inclining to red in the male, with a broad central black stripe, and the segments edged behind with white: thighs black; tibiæ brown, with the base white, nearly all white in the female; tarsi dark-brown; halteres and winglets brownish-grey, the former with the knob white: wings light grey, the nervures dark brown. 7½–9 lines.

Of occasional occurrence in many parts of the country. "Near London." *Stephens's Catal.* "Cambridgeshire, but less abundant than *Tabanus bovinus.*" *Rev. Leonard Jenyns.*

TABANUS MICANS.

Meig.—Tab. austriacus, *Fab.*—Tab. niger, *Donovan.* xvi. pl. 564.

Black; hypostome with grey pubescence; palpi and antennæ pitch-brown; eyes green, with three purple bands, at least in the female; the forehead of the latter grey, with a black spot at the base and vertex, and a longitudinal line of the same colour between them: thorax blackish, with very indistinct light coloured lines, the surface thinly clothed with greyish pubescence: abdomen black both above and beneath, with bluish reflexions; the surface of the first segment with a white pubescent spot on each side, the following segments like-

In the want of specimens of this insect, the above translation has been given of Meigen's description. It appears to be everywhere a scarce species, but it has been taken in different parts of England. Mr Stephens indicates it in his Catalogue as inhabiting the vicinity of London.

TABANUS LURIDUS. (S.)

Fallen, Dipt. Suec. 5,4.—*Meig. Zwei.* ii. 55.

Palpi and hypostome greyish-brown, inclining to yellow in the female; eyes brassy green, with three purple bands, the upper one abbreviated and placed near the middle; forehead of the female greyish, with a shining callosity at the angle of the eye, a smaller one on the crown, and a short black ridge in the space between them; two lowest joints of the antennæ blackish, the third ferruginous, with the tip black: thorax and abdomen shining black with dark-coloured pubescence, the former brownish on the sides, the latter having a ferruginous spot, with whitish reflexions, on each side of the three first segments, the anterior ones generally largest, and two or three faint triangular dorsal marks, the hinder margin of the posterior segments narrowly edged with white: underside of the abdomen ferruginous, the base and anus black; halteres dark-brown, the knob white; wings pale brownish-grey; some of the costal nervures edged with brown: thighs and tarsi black, the tibiæ testaceous with the tip dusky, the posterior fringed externally with black hairs. 6–7 lines.

Not of unfrequent occurrence. " Near London," *Stephens's Catal.* " Sutherlandshire and vicinity of Jardine Hall, Dumfries-shire," *Sir William Jardine, Bart.*

TABANUS SOLSTITIALIS.

Meig. Zwei. ii. 56.

This species approaches so closely to the foregoing as to afford reason for supposing that it is merely a variety. The principal differences consist in the colour of the antennæ, which are rufous with a small portion of the tip black, and in the under side of the abdomen, which has the first four segments entirely rufous, and the remainder black. The rufous marks on the sides of the abdomen are rather large, pale reddish-yellow, with a whitish play of colour: legs dark brown, with the tibiæ reddish-yellow, the apical half of the anterior pair brown. 5½ lines.

Has been found in the London district, but no notice has appeared of its occurrence elsewhere in Britain.

TABANUS TROPICUS. (S.)

Linn. Fabr. De Geer vi. pl. 12, fig. 15–22. *Samouelle's Comp.* pl. 9, fig. 4. *Meig. Zwei.* ii. 61. *Harris' Expos.* pl. vii. 2 ♂.

Palpi and hypostome dark grey in the male, yellowish-grey in the female, the forehead of the latter yellow, with a black callosity at the base, a narrow black line in the middle, and a shining point of the same colour on the crown; antennæ ferruginous, the apex dark brown: eyes green, with three transverse rays of purple: thorax shining dark brown, with indistinct dorsal grey lines, the pubescence in the male nearly black on the back, and brown on the sides, but entirely ferruginous in the female: abdomen black, the four first segments widely fulvous at the sides, with whitsh reflexions in the male, the centre with a dark stripe variable in breadth, sometimes bearing traces of a pale triangular spot at the hinder edge of the segments; the latter edged with fulvous; belly fulvous, dusky behind, the hairs round the sides black in the male, fulvous in the female: thighs dark brown; tibiæ ferruginous, the anterior brown before the middle, the others generally somewhat dusky at the apex, the intermediate pair with divergent hairs in the male; tarsi black; winglets yellowish-brown, halteres dusky, the extremity of the knob white; wings pale brownish-grey, the anterior margin and nervures yellowish-brown. 7¾—8 lines.

This handsome species, which is one of the most common belonging to the genus in many of the more northern parts of the continent, is found occasionally throughout Britain, but is probably more plentiful in Scotland than in the southern districts of the island.

"Near London," *Stephens's Catal.* "Cramond, near Edinburgh," *Rev. William Little.* "Near Berwick," *Dr Johnston.* "Roxburghshire, and Pentland Hills," *Mr Duncan.* "Cardoness, Kirkcudbrightshire."

TABANUS RUSTICUS. (S.)

Fabr. Gmelin, Panzer, Fauna Germ. xiii. 21.; *Meig. Zwei.* ii. 60.

Male: blackish, covered with yellowish-grey hairs; hypostome and palpi light yellowish-grey; antennæ pale ferruginous, with the apex dusky; eyes of a uniform pale green colour; thorax and abdomen densely clothed with whitish-grey hairs, sometimes inclining to yellow; breast and anterior portion of the belly light slate-grey, the hinder part of the latter dull yellow: thighs grey, black at the extremity; tibiæ yellow; anterior tarsi black, the hinder pair yellow with the apex black; wings hyaline, the exterior border tinged with yellow.

Female: forehead light yellowish-grey, with two shining black points, the upper one near the middle, and sometimes prolonged behind into a short line; eyes with an indistinct arched band near the inner side; abdomen marked with four series of dark brown spots; thighs entirely grey. $5\frac{3}{4}$–7 lines.

One of the most common species inhabiting this country; it is scarce, however, in Scotland. "Common in Cambridgeshire," *Rev. Leonard Jenyns.*

TABANUS FULVUS.

Meig. Zwei. ii. 61.—Tab. alpinus, *Shrank,* Fauna Boica; *Curtis* Brit. Ent. ii. 7–8, ♀.—Tab. sanguisorba, *Harris' Expos.* pl. vii. fig. 3.

About the size of the preceding or a little larger, brown, the whole body densely clothed with golden-yellow hairs; palpi and hypostome ochreous, inclining to pale grey; forehead of the female yellow, with a minute black spot near the middle; antennæ entirely ferruginous; eyes greenish, darker on the under side; thorax and abdomen dusky brown covered with thick-set shining golden-yellow hairs, the abdomen with a fulvous spot on each side, extending from the first segment to the posterior margin of the third; under side of the abdomen greyish-yellow; legs fulvous; anterior tarsi and apex of the tibiæ black, posterior tarsi dusky towards the extremity; halteres ochreous: wings yellow at the base and anterior margin, the sub-marginal cell with a rudimentary nerve. $6\frac{1}{2}$-7. (*Woodcut,* Fig. 3.)

Has not been frequently noticed in this country, but as it is rather common in the northern parts of France, it may yet be found in some plenty. "Two females were taken last autumn (1825) by Captain Blomer near Bideford, North Devon."—*Curtis, l. c.* "Norwich," *J. L. Brown, Esq.*

(*To be continued.*)

VII.—*Miscellanea Zoologica.* By GEORGE JOHNSTON, M. D. Fellow of the Royal College of Surgeons of Edinburgh.

"Si Commentariolos spectes, pro viribus egisse me Lectori facile persuadebo. Nec laborem huncce meum defectibus laborare negabo. Modo ad augmentum Scientiæ naturalis quædam notatu non indigna neque lectu injucunda contulisse dicar. Et hac ni fallor gloriola me exuet nemo.——Descripsi quædam, et in posterum describam, apud auctores jam obvia, vel quia leviter adtigerunt illi, vel quod nova addenda habeo. Incognitarum tamen rerum pars major erit. Et in istis etiam quæ, nota prius, retracto, fere sine eorum quæ apud alios occurrunt repetitione, nisi ea ad rem necessaria sit, ago."—*Pallas, Misc. Zool. præf.* ix.

I.—An attempt to ascertain *the British Pycnogonidæ.*

The resemblance which the individuals of this family have to the long-legged or "shepherd" spiders (*Phalangium*) led the earlier naturalists to classify them in one and the same genus, and it is sufficiently close to justify us in calling them *Sea-spiders*, were an English name necessary for their identification. They are characterized by having a crustaceous slender body, not much thicker than the limbs, and which may aptly enough be compared to a short vertebral column, each segment representing a vertebra with its prominent lateral processes. This column is divided into five segments only, which are so far anchylosed that their joints appear to admit of no motion upon one another, either to a side or perpendicularly: the anterior is rather the largest, and on its vertex there is a tubercle or small wart surmounted by four simple eyes placed in a square, but which are very difficult to detect in some of the species, if they are not actually wanting. I believe that this anterior segment is formed by the confluence of two—a cranial and thoracic, and in the *Pycnogonum*, the evidence of this division may be faintly traced. The cranial portion is sometimes lengthened out into the form of a neck and head, terminated with a short proboscis, but in others the proboscis springs directly from the truncate front into which it is inserted as in a socket. It is a tubular organ, of a crustaceous texture, of extremely limited motion in a vertical direction, and with a simple round or trifid aperture at its apex, but in most of the genera the inferior side is divided into two equal halves by a longitudinal line or plain suture. * Generally at the base of this proboscis we find a pair of *mandibles* formed of two joints, the ultimate armed with a pair of claws or pincers, one of the claws only moveable; and in one genus there is in addition to these a pair of filiform articulated organs, which have been named the *palpi*. All these belong to the cranial segment, if it is allowable to speak of this as distinct. The *thorax* consists of four segments, including the cranio-thoracic; and each of them supports a single pair of legs, articulated with the protuberant sides of the segments. The legs are all alike in form, and calculated solely for creeping; they are eight-jointed, † and the tarsus is provided with one or two strong

---

* Savigny says that in the terminal mouth we can scarcely perceive some traces of a lip and jaws,—and the manner in which the sentence is worded induces the belief that he could not discover any. Mém. sur les Anim. sans Vert. i. 55. The proboscis of a large species of Phoxichilus, from the Cape of Good Hope, appeared to be composed, says Latreille, of a lip, of a tonguelet, and of two jaws, the whole soldered together. Hence the palpi belong to the jaws. —Cuvier, Règ. Anim. iv. 276.

† The three basal joints constitute the *coxæ*, the next the *thigh*, the two following the *tibiæ*, the other two the *tarsus*, but this nomenclature is objectionable in as far as it is founded on some very doubtful analogies between the parts so named, and the corresponding parts of vertebrate animals.

claws, sometimes aided by smaller subsidiary ones moving in the same direction. The fifth segment is small or rudimentary, cylindric, without appendages of any sort, but perforated at the end with the anus, which is an oval perpendicular aperture with tumid lips: this segment is all that remains of the abdomen, which meets with its extremest reduction in this tribe of crustaceans.

The Pycnogonidæ are all marine animals. They conceal themselves among sea-weed and corallines between tide-marks; under stones within the lowest tide-line; and they are occasionally dredged from deep water. Their motions are remarkably slow, and as it were painful to our apprehension;—hence it is obvious that their prey must be either dead animal matter, or living animals as habetous and defenceless as themselves, an inference which is confirmed by the conformation of the oral organs. We are told that they live principally on the fish of bivalve shells,* which they insidiously enter as these lie gaping in their usual fashion when no danger threatens. Some assert that the Pycnogonum is parasitical on the whale, but perhaps the resemblance which this animal has to the Cyamus ceti † may have deceived the observers, and given rise to the remark, for it is certainly common on our shores where there are no whales; and Fabricius mentions that in Greenland it is found under stones on the shore, just as with us. The females are apparently fewer in number than the males, or are at least much seldomer met with: they are distinguished, as Baster first of all ascertained, by having a pair of spurious legs in addition to those common to both sexes, which originate from the inferior anterior margin of the first thoracic segment, and are appropriated to the purpose of holding and carrying the eggs. These are collected into globular masses enveloped with a thin skin or membrane, each mass firmly adherent to the spurious or oviferous leg, and consisting of a congeries of numerous round ova. There are several masses of these eggs in all the genera excepting Pycnogonum, in which the eggs form a single broad square membrane laid under the body. The changes which the individual may undergo from its birth to maturity are unknown.

---

* "Mytilorum testasque penetrat et exhaurit. J. G. König," in Lin. Syst. Nat. 1025. Of his Pycnogonum grossipes, O. Fabricius says, "Vescitur insectis et vermibus marinis minutis; quod autem testas mytilorum exhauriat, mihi ignotum est, dum nunquam intra testam mytili illud inveni, licet sit verosimile satis."—Faun. Groenl. 231.

† This resemblance misled Fabricius when he put the Cyamus and Pycnogonum in the same genus.

There has been, and there still is some diversity of opinion among naturalists relative to the place which this family ought to occupy in the "Systema Naturæ." Linnæus placed the only two species with which he was acquainted in the genus *Phalangium,*—a kind of land spiders standing between the mites (*acari*) and true spiders (*araneæ.*) The impropriety of mixing them in this manner with the terrestrial Phalangia was soon perceived; and Otho Fabricius separated them, assigning the name *Pycnogonum* (previously used by Brunnich) to the marine species. He was followed by Muller, the discoverer of some additional species. Fabricius, the entomologist, divided all that had been made known previous to his time into two genera, viz. *Nymphon* and *Pycnogonum;* and Latreille, his immediate successor in the throne of entomology, was at first of opinion that the peculiar characters, especially the tubular mouth of the Pycnogonidæ, justified him in elevating them to a distinct order among his "insecta acera," which includes the myriopods, spiders, and mites. He afterwards saw reason to degrade them from this rank to that of a "family," which he located, after Linnæus, between the phalangoid spiders and the mites. He created a new genus (*Phoxichilus*) for the reception of a species which would not harmonize with those already characterized.* In Lamarck's system, which proceeds from the less perfect to the more complex animals, the Pycnogonides are found in the second order of his Arachnides, characterized by their want of antennæ, by breathing through branched not ganglionated tracheæ, and by having two or four simple eyes. They follow, and are consequently considered superior to the mites and Phalangia; but being associated in one section with the Pseudo-Scorpions they are to be considered coequal and affined to them,† a conclusion than which nothing can be more erroneous.—Dr Leach, in his first essay, published in the Edinburgh Encyclopedia, made of these animals an order amongst the Arachnides, which he named "Podosoma," and which he divided into two tribes,—Gnathonia and Agnathonia—characterized by the presence or absence of mandibles. The names of the tribes were subsequently dropped, and they assumed the rank of families, the former being called Nymphonides, the latter Pycnogonides, while the ordinal name was altered to " Podosomata," which, however, was still allowed to stand amongst the Arachnides;* but Dr Leach latterly became so perplexed with doubts and difficulties relative to this family's relationship to other animals, that he dissevered it entirely from the system, and threw them into an appendix.†

---

* The changes in their relative position which Latreille subsequently made are immaterial. In the Règ. Animal, they constitute the second, and in his "Familles Naturelles" the first family of the Arachnides Trachearíæ, following the Pseudo-Scorpions and preceding the Phalangia and mites,—a station of the goodness of which he very properly expresses his suspicion; and he afterwards suggests that the Pycnogonidæ should form a particular order, intermediate to the Arachnides and the apterous parasitical insects.—Règ. Anim. iv. 277. Fam. Nat. du Règne Anim. 318.

† Hist. Nat. des Anim. s. Vert. v. 72.

Hitherto then the Pycnogonidæ appear to have been considered as insects nearly allied to the mites and spiders. Otho Fabricius had long ago hinted that they were probably of nearer affinity to Crustaceans,‡ but the hint was forgotten until Savigny, by a very ingenious analysis of their organs, arrived at the same conclusion: he believes that they are the group by which nature passes from the Crustacea to the exantennulate spiders, and belonging rather to the former than the latter class. His opinion does not seem to have induced any systematist to alter the usual location of these animals excepting Milne Edwards,§ who has entirely embraced it, and acted upon it. As the question is not one of mere convenience, for, according as our decision is more or less consonant to nature, so will our views be in reference to the distribution of the groups of these classes, I will enter a little into the discussion.

The reasons for arranging the Pycnogonidæ with the Arachnides appear to be these:—1. The general resemblance they have to the members of that class; 2. the absence of external branchiæ; 3. the sameness in the number of legs; 4. the similarity in the position, structure, and arrangement of the eyes; 5. the simplicity of their organization, more especially of the circulating system. At a first glance these reasons are seemingly of great weight, but a narrow examination may shew that they are unsatisfactory. There is perhaps nothing more characteristic of the spiders than the great proportionable size of the abdomen, and the coalescence of the thoracic segments, but in the Pycnogonida the abdomen is reduced to its minimum, while the thorax is much enlarged, and consists of four distinct segments, so that the resemblance between them and some Phalangia is evidently unreal and illusory. The absence of bran-

---

* Linn. Trans. xi. 387. Lond. 1815.

† Samouelle's Ent. Comp. 305. Lond. 1819.

‡ Faun. Grœnl. 229.*

§ Risso scarcely affords an exception. He places the genus Nymphon amongst the Lemodipodous crustaceans, next to Caprella!—Hist. Nat. de l'Europ. Merid. v. p. 102.

chiæ is admitted, but neither can it be shewn that they breathe through tracheæ after the manner of spiders: it is probable that the aëration of the circulating fluid is effected by the mere contact of the water in which they all live with the external surface, a mode of respiration not unknown among some of the less perfect crustaceans.* To determine whether or not they agree in the number of legs with Arachnides may seem an easy matter, and upon the determination the question of their location mainly depends. If we merely reckon the number of members used for locomotion, the agreement is exact; there are four pairs in spiders, and four pairs in the sea-spiders; but Savigny's researches appear to have proved that some parts have been overlooked which ought properly to enter into the calculation. By tracing, with the hand of a master, the mutations of the organ through the more remarkable families of crustaceans and apterous insects, he first shews that the so-called proboscis of the Pycnogonum is a *head*, without any analogy with the sucker of some acaridans; and were the Pycnogonidæ to be classified with the Arachnides they would be anomalous there; the only cephalous family in the class. The proboscis being admitted to be of the nature of a head, the conclusion necessarily follows that the members, whose true character is concealed under the designations of mandibles, palpi, and oviferous organs, are merely modifications of the legs, which have undergone less change of form than the corresponding legs in many other families of the crustacea; so that, like the crustaceans, the Pycnogonidæ have in reality seven pairs of legs.† "If we attentively examine," says Savigny, "the mandibles and palpi, we must conclude that the family of the Pycnogonum is that in which these organs differ least, either in position or in usage, from the ordinary feet. Their insertion is very far removed from the aperture of the pharynx, which is often placed beyond their reach; the insertion is made not into the head, nor to the advanced segment which supports the head, but immediately to the thorax. The palpi are not attached to any sort of jaws. And what is to be thought of the total occasional suppression or obliteration of these organs? In fact, if the Nymphons have both palpi and mandibles, the Phoxichiles have mandibles only, and the Pycnogonum has neither mandibles nor palpi. These curious facts have been observed by M. Latreille, and by myself, in individuals in his collection.

---

* Latreille conjectured that the Pycnogonidæ mgbit respire by means of the tubular abdominal segment, as some larvæ are known to do, but the conjecture has no observation in its support.

† Savigny, Mem. sup. cit. 56.

Nevertheless, the three genera seek the same aliment,—they are all equally carnivorous,—an unanswerable proof that the parts to which the names of palpi and mandibles have been given in the Nymphons are not necessarily employed in manducation; that the mouth has its proper existence independent of those parts; that it is essentially composed of other organs,—and this point is so decisive that we may doubt whether the Pycnogonidæ, hitherto arranged with the Arachnides, would not be placed with greater propriety among the crustacea."*

Some naturalists cannot coincide in this suggestion, because of the great simplicity of the anatomy of the Pycnogonidæ, which is very inferior to that of the crustacea. The simplicity of their structure must be admitted; the alimentary canal appears to be a straight intestine extended between the mouth and anus, with some lateral expansions or cœca; and the circulating system is probably reduced to a single vessel which occupies the centre of the thoracic segments, and sends a branch to each member or limb, in which the blood has an irregular movement, but cannot be said properly to circulate. The rest of their anatomy is unascertained. But the argument hence deduced is one which will equally forbid their admission among the Arachnides, for the typical spiders are little less highly organized than the typical crustaceans; and M. Edwards has shown that, by assuming anatomical characters as the basis of classification, the most unnatural combinations would be the result, so that even they who have advocated the superiority of these characters, have found an adherence to their principles quite impracticable in the classification of avertebrate animals. It is a better and safer method to arrange these animals in as many groups as there are distinctly recognizable series formed by the successive simplification or degradation of each distinct organism. In this way we are not arrested by differences of anatomical structure, when these are confined to mere differences of complexness; and, in the instance of the Crustacea, we attach to the class all those species whose general organism, however simple, has no deviations incompatible with that of the types of the class, but which simplicity is, if we may so speak, the result of an arrest to its developement, and recalls by its similarity, the transitory conditions through which the most perfect constituents of the class have passed during the continuance of their embryonic life. To proceed thus may seem to be acting contrary to the recognized principles of natural systems, and one is apt to be startled at a proposal to gather together in one category animals which breathe by gills or branchiæ, with others which have no special organs for the performance of that important function, being reduced to respire by the skin ;—animals which have a heart and a very complicated vascular system, with others which have no heart and no very distinct vessels ;—animals which have a powerfully armed mouth and greatly developed chylopoetick viscera, with others which are sucklings, and whose intestines are fitted for the digestion of no solid food. But these difficulties disappear when we discover how much these organs, so influential in the higher animals, are modified before they entirely disappear in these less perfect beings ;—how they become by little and little rudimentary previous to their obliteration, a loss which is then little felt, and is not accompanied with any essential change in the type of their organization. Branchiæ, for example, become rudimentary and disappear, to be replaced and have their functions performed, by the common integuments in some crustaceans, almost alike, in other respects, to others which are furnished with these organs in a state of high developement, and that too without any notable modification in the other great systems. The blood-vessels cease to have distinct parietes, and exist no longer excepting as simple lacunæ in some crustacea, which it is impossible to separate from other animals of the same class having a very complete vascular system ; and the heart becomes rudimentary, and perhaps even completely disappears, although nothing has occurred in the body generally to reveal its absence. These facts have induced M. Edwards rightly to place in the class Crustacea not only the articulated animals with jointed feet, having a complete circulation and branchiæ—the characters which are usually assigned to it,—but also all those which, formed on the same general plan, are more or less imperfect, and in one sense degraded. The group thus formed will be more difficult to define, but better this than that it should be circumscribed by arbitrary limits. *

---

* Mem. sup. cit. 75–6.

Class CRUSTACEA—Sub-class C. HAUSTELLATA.
Order, ARANEIFORMES, *M. Edwards.*
(Podosomata, *Leach.*—Pycnogonides, *Latreille.*)

Character.—Animals crustaceous, araneiform : head rostrate, tubular, the mouth terminal, simple : thorax linear, of 4 sub-equal segments, the anterior with 4 simple eyes placed on a dorsal tubercle : legs 8, exclusive of the auxiliary organs to the head, very long proportionably, ambulatory, raptorious, 8-jointed : abdomen rudimentary; anus terminal.—Marine: oviferous, carrying the eggs in masses attached to the spurious legs. The genera are—

---

* Hist. Nat. des Crust. i. 227–8.

I. Pycnogonum. Rostrum without mandibles and palpi; legs stout, the first tarsal joint minute, the claws simple; oviferous legs 10-jointed, the terminal joint claw-like.

II. Phoxichilus. Rostrum without mandibles and palpi; legs slender, the first tarsal joint minute, the claws double, unequal, sharp; oviferous legs 7-jointed, the terminal joint tubercle-like.

III. Orithyia. Rostrum sessile with a pair of chelate mandibles; palpi 0; legs slender, monodactyle, the first tarsal joint minute; oviferous legs 5-jointed, the terminal joint claw-like.

IV. Pallene. Rostrum raised on a neck, with a pair of chelate mandibles; palpi 0; legs slender, monodactyle, with auxiliary claws, the first tarsal joint minute; oviferous legs 10-jointed, the terminal joints serrulated.

V. Nymphon. Rostrum raised on a neck, with chelate mandibles and palpi; legs slender, monodactyle, with auxiliary claws, the tarsal joints sub-equal; oviferous legs 10-jointed, the terminal joint claw-like.

I. PYCNOGONUM,* *Brunnich.*

1. *P. littorale.* (Plate xii. Fig. 1, 2, 3.)

Phalangium Balænarum, *Lin.* Syst. 1028. *Mull.* Zool. Dan. prod. 192, No. 2294. *Pen.* Brit. Zool. iv. 43, pl. 19, fig. 7. *Turt. Gmel.* iii. 716. *Stew.* Elem. ii. 326, (the description very inaccurate.)—Acarus marinus seu Polygonopus, *Pallas,* Misc. Zool. 188, tab. 14, fig. 21–23.—Pycnogonum littorale, *Fabr.* Faun. Groenl. 233.—P. Balænarum, *Latr.* Gen. Crust. et Ins. i. 144. *Leach.* in Edin. Encyclop. vii. 413, pl. 221, fig. 11. Lin. Trans. xi. 388. *Sam.* Ent. Comp. 305. *Lamarck,* Anim. s. vert. v. 76. *Savig.* Mem. sur les Anim. s. vert. i. 112, pl. 5, fig. 3. *Stark,* Elem. ii. 203.—Cancellus belgicus, *Walker's* Essays on Nat. Hist. 215.

HAB.—Under stones and amongst sea weeds at low-water mark; and amongst corallines in deeper water. "On many parts of our coasts, but is not common," *Leach.* Frequent on the coast of Berwickshire.

DESCRIPTION. *Animal* araneiform, of a yellowish-brown colour, naked, finely granulous, the granules almost even with the surface: *rostrum* paler, smooth, thick, conical with a slightly dilated cylindrical apex and trifid aperture,† two thirds the length of the body, porrect or deflected: *cranial segment* coalescent with the next, not produced anteriorly, the back with a large tubercle on which the

---

* Name from πυκνὸς thick, and γονυ a knee.

† Dr Walker says the mouth "consists of an aperture with four valves."

eyes are placed in a square, the anterior clusters rather more approximated than the posterior: *body* of 4 transverse segments, each armed with a dorsal tubercle along the medial line, and an obtuse one on each side, within which there is a round depression; the posterior margin of the segments elevated, the fourth narrower, obcordate, its tubercle placed forward, while behind it is terminated by the narrow cylindrical *abdomen*: *legs* 4 pairs, the first and second rather longer than the third, and the fourth are still shorter, all of them with 8 joints nodulous at the knees; the three basal *(coxæ)* short, sub-equal, the fourth and fifth twice as long, with two unequal tubercles on the distal ends and a bulged process underneath, sixth joint shorter than the fifth, seventh minute, globular, eighth curved, as long as the sixth, and terminated with a sharp claw,—the joints forming the tarsus covered with a very short hairiness on the under surface.

The female appears to be rare. She carries her innumerable ova, enveloped in a broad square gelatinous membrane or apron, under the body between the legs, where they are attached in front to a pair of filiform jointed organs, which originate from a callous ring that encircles the base of the rostrum. The joints are 10, the 5 basal ones shorter than the others, while the terminal one forms a slightly curved sharp claw.—Linnæus describes the rostrum as being of the length of the feet—" *rostrum* membranceum, subsubulatum, longitudine pedum,"—which, if not an error, might seem to indicate another species.

Fig. 1. The male, nat. size.—2. The female slightly magnified and seen from below.—3. One of the oviferous legs magnified.

II. PHOXICHILUS,* *Latreille.*

1. *Ph. spinosus.*

Phalangium spinosum, *Montagu*, in Lin. Trans. ix. 100, tab. 5, fig. 7.—Phoxichilus spinipes, *Leach*, in Edin. Encyclop. vii. 412.—Phoxichilus monodactylus, *Lam.* Anim. s. vert. v. 75.—Ph. hirsutus, *Stark*, Elem. ii. 208.—Ph. species, *Cuv.* Reg. Anim. iv. 278. *Leach*, in Lin. Trans. xi. 389.

HAB.—" South coast of Devonshire," Montagu.

DESCRIPTION.—" Body linear: snout long, cylindric deflected: no feelers: eyes four, fixed in a conical tubercle on the top of the fore part of the body behind the snout, placed two forward, two backward, and appear under a microscope strongly reticulated; the tubercle on which they are seated, verrucose: on the back between the hinder pair of legs is an erect cylindric tubercle, which in some point of view might be mistaken for a tail; the summit of this is furnished with two minute spines: legs long, slender, spinous."—"Length of the body a quarter of an inch. Colour rufous-brown.

---

* Formed from φοξος sharp, and χηλη a claw.

"The female is furnished with a pair of long jointed appendages, which originate at the fore part of the thorax, and turn underneath, as described by the figure. The use of these antennæ-like members is for holding and carrying about their eggs."—*Montagu.*

Dr Leach, after his brief notice of this species, adds, "Two specimens, which were most obligingly communicated by R. Stevenson, Esq. from the Bell-rock Lighthouse, on the Scottish coast, in a living state, were of a blood-red colour, and are possibly distinct." And after his character of the genus in the Linnæan Transactions he appends the observation—"species multas indigenas possideo, at characteres nondum elaboravi."—*Leach.*

The Phoxichilus spinipes of Lamarck, Anim. s. Vert. v. 75, is a sadly confused species, which it will be found impossible to determine by the most zealous commentator.*

III.—Orithyia,† *Johnston.*

1. *O. coccinea,* (Plate xii. Fig. 4, 5, 6.)

Pycnogonum grossipes, varietas, *Fabr.* Faun. Groenl. 231.—Nymphum coccineum, *Johnston,* in Zool. Journ. iii. 489; and in Mag. Nat. Hist. vi. 42, fig. 7, *b.*

Hab.—Amongst confervæ between tide marks. Not very uncommon in Berwick Bay.

Description.—*Animal* araneiform, slender, of a uniform fine clear red colour, with the joints of the legs and tarsi yellowish, and when magnified a central vessel, distinguished by its deeper tint, is seen running uninterruptedly through the body and legs: *rostrum* yel-

---

* Lamarck's definition of his "Phoxichilus" is the same as that which I give of "Orithyia," but I could not retain the former name, having applied it to an emandibulate species, after the example of Leach. Some have erroneously described the Phalangium spinosum of Montagu with a pair of palpi, mistaking the oviferous legs for such,—a mistake which has originated from consulting the figure without reference to the description.

† Orithyia—"Dilectâque diu caruit Deus *Orithïa,*
Dum rogat, et precibus mavult quàm viribus uti."
Ovid. Metam. lib. vi. fab. 8.

"———— flerunt Rhodopeïæ arces,
Altaque Pangaea, et Rhesi Mavortia tellus,
Atque Getæ, atque Hebrus, et Actias *Orythia.*"
Virg. Georg. lib. iv.

lowish, porrect, cylindrical, somewhat thickened outwards, divided beneath by a mesial line, shorter than the *mandibles*, which originate from the anterior margin of the first segment, and are biarticulate, the basal joint long, while the second forms a short ovate hand armed with two small sub-equal curved claws: *body* 4-jointed, the first with an oculiferous tubercle, the eyes obscure: *legs* four pairs, with a very few widely scattered short hairs, three times the length of the body, equal, 8-jointed, the basal joint short, the second somewhat longer than the third, the fourth slightly dilated, elongate, fifth and sixth slenderer, but as long, seventh minute, eighth rather long, falciform, spinous on its inferior edge and terminated by a single rather long claw. Length of the body two lines, of the legs six. With a common magnifier the body appears very smooth, but when a more powerful glass is used it and the legs are seen to be roughish with minute granules.

O. coccinea lives among sea weeds between tide marks; and when at rest, with the legs drawn up, it so closely resembles some of the fine-coloured confervæ, but more especially a detached portion of the Chondria articulata, as to be easily overlooked. It appears to me interesting in so far as its transparency allows us to examine its circulating system with an accuracy which perhaps no dissection could enable us to amend. Close to the oculiferous tubercle we see the vessel (for there is no heart) divide into two equal branches, one to each mandible; and the flux and reflux of a fluid is easily observable in them. From the tubercle the vessel runs down the body, giving off a single branch, equal in size to the trunk, to each leg; and this branch continues uninterrupted to the tarsus. Neither in the trunk nor branches could any movement of the fluid be perceived.

The ova are carried under the body of the female, which is comparatively very rare, collected into eight globular packets of a yellowish colour. They are attached to the oviferous filaments which originate from the first segment between the base of the proboscis and the legs, and consist of five joints, the basal one ovate, while the four following are cylindric, elongate, subequal, or rather the terminal one is the shortest. There is no vestige of these organs in the male; nor the slightest trace of palpi in either sex. The segments of the thorax are so prominent at the sides that the coxæ appear to be composed of four instead of three articulations.

Fig. 4. Orithyia coccinea, nat. size. 5. the same magnified. 6. the anterior part of the female seen from below and magnified.

IV.—PALLENE,[*] *Johnston.*

1. *P. brevirostris.* (Plate xii. Fig. 7, 8.)
Pycnogonum spinipes? *Fabr.* Faun. Groenl. 232.—Phalangium spinipes? *Turt. Gmel.* iii. 715.—Phoxichilus spinipes? *Latr.* Gen. Crust. et Ins. i. 144.

HAB.—Amongst corallines from deep water. Coast of Berwickshire.

DESCRIPTION.—*Animal* araneiform, very slender, pellucid and colourless, sparingly hispid, the hairs patent: *proboscis* semiovate, short, porrect, the *mandibles* originating at its base and overtopping it; they are 2-jointed, didactyle, the claws curved: *anterior segment* produced in front so as to form a sort of neck enlarged at the origin of the mandibles: *oculiferous tubercle* between the insertions of the first pair of legs: *abdomen* obsolete: *legs* very slender, cylindric, nearly equal, 8-jointed, the first and third shorter than the second, fourth fifth and sixth elongate, subequal, seventh minute, eighth somewhat falcate, spinous on the inner aspect, armed with a strong moveable claw and two lesser ones moving in the same direction. *Oviferous legs* filiform, 9-jointed, the basal joint short, the second, third, and fourth elongate, the five others shorter, subequal, while the three terminal ones are rather strongly serrulate along one side.

Fig. 7. Pallene brevirostris of the natural size; 8. the same magnified.

V.—NYMPHON.[†] *Fabricius.*

1. *N. femoratum*, "reddish; thighs dilated and compressed." *Leach.*
Nymphum femoratum, *Leach*, in Zool. Misc. i, 45. tab. 19, fig. 2. Linn. Trans. xi, 390. Suppl. Encyclop. Brit. i, 433. *Sam.* Ent. Comp. 306. *Stark*, Elem. ii. 203.

HAB. "In Angliæ occidentali mari. I discovered this species on the shores of the Plymouth Sound, but am indebted to the researches of Mr J. Cranch of Kingsbridge, for the fine specimen from which our figure is taken."—*Leach.*

2. *N. gracile*, "cinereous; thighs cylindric." *Leach.* (Plate xii. fig. 9–12.)
Phalangium grossipes, *Lin.* Syst. 1027. *Turt. Gmel.* iv. 715. *Stew.* Elem. ii. 326.—Phalangium aculeatum, *Montagu, in* Lin. Trans. ix. 101, tab. 5. fig. 8.—Pycnogonum grossipes? *Fabr.* Faun. Groenl. 229.—Nymphon grossipes et aculeatum, *Leach* in Edin. Encyclop. viii. 412. N. gracile, *Leach*, Zool. Misc. i. 45, tab. 19. fig. 1. Supp. Encyclop. Brit. i. 433, pl. 23. *Sam.* Ent. Comp. 306. *Stark* Elem. ii. 203. pl. 6. fig. 17:

HAB.—"Inhabits the British seas every where." *Leach.*

DESCRIPTION.—*Animal* araneiform, very slender, of a pale yel-

---

[*] "Hic nunc Emathiæ portus, patriamque revisit
Pallenen."—Virg. Georg. lib. iv.

[†] Formed from νύμφη—water.

lowish or greyish colour, pellucid, the legs roughish and sparingly hispid with a spine at the distal end of the femoral joints: *First segment* produced into a sort of neck dilated at the apex where it supports the rostrum, mandibles and palpi; the *rostrum* cylindrical, as long as the neck, divided beneath with a mesial line; *mandibles* biarticulate, the first joint reaching beyond the rostrum, the second short, hispid on the external side, and armed with two claws; *palpi* filiform, 4-jointed, the two basal joints elongated, the others short and hispid: *oculiferous tubercle* distinct: *legs* four times the length of the body, almost filiform and equal, 1st and 3d joints of the coxæ considerably shorter than the second, which is incrassated distally, the thigh and first joint of the tibiæ elongated and equal, the second tibial joint still longer, first tarsal joint half as long as the second, which is hispid and spinous on the inner surface and armed with three moveable sharp claws, of which two are merely auxiliary: *oviferous legs* filiform, long, the two basal joints short, the third and fourth twice as long, the fifth shorter, equal to the sixth, which is rather longer than the three next, which are armed below with a double series of spines, the terminal joint forming a claw: abdomen small, cylindric or slightly tapered posteriorly.

After his description of this animal Linnæus adds—"Mirum tam parvum corpus regere tam magnos pedes." Fabricius says it has the power of reproducing its lost members. "Mutilatur etiam in libertate sua, redintegrandum tamen: vidi enim, in quo pedes brevissimi juxta longiores enascentes, velut in asteriis, cancris aliisque redintegratis."

It may be considered doubtful whether the species figured by us is identical with the Phalangium aculeatum of Montagu, or the Nymphon gracile of Leach, for neither their descriptions nor figures are sufficient to determine the question, and in this uncertainty I have thought it advisable to bring them all together as synonymous, until further inquiries shall shew that we possess more native species, which is most probable. Leach, in his character of the genus, says the palpi are 6-jointed, and the claws simple, while the former appear to be only 4-jointed in our species, and the latter have accessory claws. Some authors have placed Montagu's Ph. aculeatum in the genus Phoxichilus, an error which has arisen from their consulting the figure, which is defective, without reference to the description.

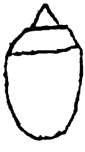
The Nymphon grossipes of Latreille and Savigny, (Mem. ii. p. 111: pl. 5, fig. 2.) is altogether distinct from our N. gracile; and may be known by the joints of the mandibles being nearly equal in

length, by the slender palpi of which the terminal joints are elongate, by the second joint of the legs being more than twice the length of the first, and by the oviferous legs of which the three basal joints are stouter than the fourth, and this again is much stouter than the others, which form a sort of filiform appendage.

Fig. 9. Nymphon gracile, nat. size; 10, the same magnified; 11, the head still more highly magnified and seen from below; 12, an oviferous leg highly magnified.

VIII.—*Remarks on the Reproductive Organs of Pilularia globulifera, and the Globules of Chara vulgaris.* By Mr GEORGE DICKIE.

PILULARIA GLOBULIFERA belongs to the natural order Marsileaceæ; the essential characters of which are, according to Lindley, "creeping plants; leaves petiolate and divided, (or petioles destitute of lamina,) rolled up in vernation. *Reproductive organs* inclosed in leathery involucres, and of two kinds, the one consisting of membranous sacs, containing a body or bodies which germinate, the other, of similar sacs, containing loose granules." Sir W. J. Hooker gives the following definition of the genus Pilularia: "Involucres solitary, nearly sessile, globose, coriaceous, four-celled; each cell containing two different kinds of bodies; (anthers? and pistils?") The larger of these have been considered as thecæ by Brown, Hooker, Greville, and others. Annexed is a magnified representation of one of the thecæ. The smaller bodies are more numerous than the others, and their shape is simply orbicular; both consist of a tough white membrane. Each of the larger bodies is contained in a reticulated transparent membrane, the smaller are in clusters inclosed together in a similar membrane. If one of the supposed thecæ is ruptured, there issue numerous round transparent particles; these have been considered as sporules. While engaged in examining the nature of these particles, a zealous and accurate observer, Mr Peter Grant, of this place,[*] suggested to me the propriety of employing chemical tests. I furnished him with specimens, and, on examination, he discovered that the supposed sporules were coloured blue by iodine, thus demonstrating that they are grains of fecula or starch. I have observed that along with the fecula there exists a fluid which possesses all the properties of a *fixed oil.*



The small orbicular bodies have been supposed to be analogous to

---

[*] Aberdeen.

the anthers in flowering plants.* They contain a yellowish granular matter, the particles of which, as far as I have observed, possess no definite form. I am not aware that any experiments have been made in order to ascertain the relative importance of these two kinds of reproductive organs in Pilularia; but in Lindley's Natural System of Botany it is stated, that Professor Savi of Pisa found that in Salvinia, belonging to the natural order Marsileaceæ, the seeds so called, and the supposed small globules, must both be present to produce germination in the former. Duverney, on repeating Savi's experiments, has, however, observed that the seeds when separated from the small particles, were capable of developement. The presence of *fecula* and *oil* in the larger reproductive bodies of Pilularia would seem to indicate an analogy between them and the seeds in flowering plants.

Recently, while examining the globules and nucules of Chara vulgaris, I remarked, that the former of these contain in many instances round transparent particles intermixed with the filaments. These particles give a blue colour with iodine. The presence of fecula seems, however, to be of rare occurrence in the globules, as it is much more frequently absent than present. Dr Greville describes the nucule as being "sessile, oval, solitary, spirally striated, having a membranous covering, and the summit indistinctly cleft into five segments; *the interior is filled with minute sporules.*" These so called sporules are particles of fecula, which may easily be demonstrated by bruising a nucule in a drop of water under the microscope; the round particles which issue will be found to possess all the physical characters of fecula enumerated by Raspail, and finally, the addition of a drop of solution of iodine will decide their nature. Along with the fecula in the nucule, a *fixed oil* is also present.

---

* Lindley suggests that they are abortive sacs analogous to the larger bodies.

REVIEWS AND CRITICAL ANALYSIS.

I.—*A History of British Fishes.* By WILLIAM YARRELL, F.L.S. Illustrated by Wood-cuts of all the Species, and numerous Vignettes. 8vo. 2 vols. J. Von Voorst. London, 1835, 1836.

"THE large and constant supply of excellent food obtained from the seas all round the coast by moderate labour and expense, and the employment afforded to a numerous and valuable class of men, who become not only good seamen but able pilots, since the successful exercise of their occupation depends on an intimate knowledge of the nature of the ground surface, the situations of banks and channels, with the particular direction and force of tides and currents, render the British fisheries, in many points of view, a branch of political economy of great national importance."* Such is Mr Yarrell's recommendation of his favourite pursuit, and we cordially agree with him in its importance. Ichthyology has ever been with us a favourite study; in all its branches we delight, though we may plead guilty to a slight partiality for the "gentle art of the angle," as Isaac hath it, or, in other words, to the practical more than the theoretical departments of the science. It is a study, moreover, which is better calculated to lead the mind to that of more exalted things than perhaps any other branch of the Vertebrata. The medium in which the creatures move is of difficult and uncertain access; there is a mystery in ocean's depths which whets the innate curiosity of man; yet, whether it is pursued on the open sea beach, by the banks of some noble lake or stream, or along the devious course of some wild and noisy torrent, there is a serenity of mind induced favourable for meditation, leading from the bright and glittering prey,—the object of the sportsman's ardour,—to the contemplation of its Maker; and the thoughts almost invariably turn to the tenants of more ample waters, the myriads of creatures,

> Strange forms, resplendent colours, kinds unnumbered,
> With swords, saws, spiral horns, or hooked fangs,

---

* Mr Yarrell's Preface.

wonderful, most wonderful in structure, that swarm in the expanse of the mighty waters which are placed on the surface of the world. And will it not be accounted strange, then, that it has only been since the commencement of the present century, that the study of this interesting and important class of living creatures has really received an impulse, and has begun to be examined by the same principles and careful analysis to which the other sections are subjected.

Looking to the early literature of the science generally, we have various writers, of as varied fame and talents, touching upon the natures of fish in their historyes and poetry; but they were more taken up with the dieteticks of the art, than with the structure of the creatures. So was it also in the olden time of British story. The stews and vivaries occupied the most attention, and in the record of an accurate and quaint historian, "as every water hath a sundrie mixture, and therefore is not stored with every kind, so there is almost no house, even of the meanest tounes, which have not one or mo ponds or holes made for reservation of water instored with some of them, as with tench, carpe, breame, roach, dace, eeles, or such like, as will live and breed together."* The middle of the sixteenth century, perhaps, affords us the first names which can be quoted as scientific. Belon, Rondolet, and Salvianus are sufficiently known. Between the dates of the works of these authors, to nearly the middle of 1600, we find many which have treated partially of Ichthyology; and about the same period, the compilation of Johnson gave a kind of new zest to the subject in this country. Two British names, however, of the same age, but a few years later, did more for the advance of the science than all which had been previously achieved,—more, perhaps, every thing considered, than has even since been accomplished. Reducing from a chaos the observations of their predecessors, they produced an arrangement which has allowed their followers to re-arrange with comparative facility, and which, in fact, constitutes the basis of the systems which were afterwards proposed, while their descriptions of formerly known or newly observed species are characterized with a greater degree of accuracy. It will easily be perceived that we allude to Willoughby and Ray, names inseparable from each other, and from the history of British Ichthyology.

From the date of the works of these excellent men to the middle of 1700, there appears a wide gap, so far as the literature of the science is connected with the inhabitants of the British waters. Linnæus and his pupils, and Artedi, were much indebted for their information to the naturalists of this country. But it is not, we believe, until the appearance of the British Zoology of Pennant in 1769, that we can lay claim to any work devoted to the history of our native fishes. Subsequent to this, we have again only partial accounts and treatises scattered in the periodicals of the time, and in the works of Banks and Solander, Forster, Gmelin, and Shaw. But in comparative anatomy, the age was more fertile, for Cheselden, the Hunters, and Monro secundus, gave to the world the results of their researches, which have kept their place to the present day.

---

* Holinshed, Hist. of England. The necessity of having a regular supply of fish during Lent and other Catholic holidays, may account for the remarkable attention paid to the breeding of them in these early times.

In the conclusion of the eighteenth and beginning of the nineteenth centuries, it was evident that the science was slowly and quietly gaining ground. Berkenhout's last edition contained a "Synopsis of the Natural History of Great Britain and Ireland;" Shaw was occupied with the Ichthyological part of his General Zoology; Low described several northern fishes in his Fauna Orcadensis; Montagu read some interesting papers to the Wernerian Society; and an industrious naturalist commenced and completed a work of much merit. This work of Donovan, begun in 1802, was published in numbers, and forms five 8vo volumes, with coloured plates of 120 species. Many of the figures are remarkably good, and the descriptions are often accurate, but the price was much beyond the reach of the general purchaser, and this excluded it from the library of the student. Turton's Compendium of our Fauna, indeed, might easily have found a place there, had not the very unattractive appearance of his little volume, and the dry nakedness of the compilation, and its inherent want of value, been as effectual to its non-admission as a prohibitory price. Fleming's British Animals in 1828, gave the next most complete synoptical arrangement of our fishes;[*] after which our progress was marked by many excellent papers in our periodicals and transactions, in which Montagu continued to contribute, and the names of Couch, Fleming, Neill, Jardine, and our author, bore prominent parts; discoveries and additions were making rapidly, and a work of moderate size and moderate price, giving a connected view of the latest acquisitions, with figures and descriptions of the species which claimed existence in the seas and rivers of our islands, was, in 1835, anxiously called for.*

---

[*] We should not neglect here the important attempt made in the same year by our learned countrywoman, Mrs Bowdich, to illustrate the fresh water fishes of Britain by drawings and descriptions. The manual labour required by the manner in which the work was prosecuted was much too great, while other circumstances stopped its publication before it could be of use to science.

Happily, we can now introduce a work which will supply this vacancy; but in doing so, it were ungrateful not to remember and mark the debt we owe to the genius of Thomas Bewick, for certainly his volumes created the taste and demand, which is now so prevalent for similar productions. The felicity of expression which pervaded all the figures of that artist, and the fidelity to nature with which they were drawn, won their own way, and in a short period diffused more taste for, and knowledge of, British ornithology, than the more expensive or beautifully illustrated publications of our countrymen. Their price was moderate, and they were understood by the young; we have, night after night, in our early days, watched the arrival of the gamekeeper, whose orders were to bring in every thing, and, Bewick on our knee, compared the contents of the bag with his living pictures. Winter was a glorious time; hard frost, and less cultivation than at present, rendered wild fowl abundant; and some species were frequent, which now are to be seen in the vicinity only at intervals far and wide between. These books gave a general love for the subject; annotations and comparisons were made, which grew into new discoveries and materials for new Faunas; and we foresee the time when the work before us will produce similar effects. Fishes are already sought for (and have been found) which are not in "Yarrell's work." It is, indeed, a "worthy work." Wood-cutting in Bewick's day was but in infancy; and had it not been touched by his own hand and peculiar spirit, it might have yet remained so. Here we have it in its matured state; and, looking to the volumes with the eye of an artist, we should say the art is almost complete. But we must offer our congratulations to the public upon another part. The typography and wood-cutting we look upon as the shell; let us see if the Mollusc will grace its covering? It is a little more unobtrusive, but more minute examination displays its structure. The letter-press of Mr Yarrell's volumes has sufficient of popularity mixed with its texture to render it easily understood by all readers, while the dignity of science has been throughout maintained. The descriptions are plain, simple, and unaffected; entertaining enough for the general reader, distinct and detailed for the man of science,—can we say more? When we earnestly recommend it to the British student as the best guide to the Ichthyology of his country, and to the scientific naturalist abroad as a work of much utility, perhaps its author will be satisfied.

---

* In omitting the title of Mr Jenyns's useful manual, we are not unaware of its importance, but it appeared nearly contemporary with Mr Yarrell's work, and the notes of that gentleman were confessedly much employed in it. Neither are we blind to the new era commencing with the works of Cuvier and Valenciennes, and Agassiz; but their importance, though lending an aid to local Faunas, will be much more universally diffused.

Having thus given our opinion of this excellent "History," let us go into a little detail; make our observations as they were noted in reading through the book; pick a fault or two, and exhibit a specimen of our author's style, which may excite the few naturalists who want the work, to add one to their libraries which, so far as British Ichthyology is concerned, we deem indispensable.

The volumes open with the Percidæ and the common perch, a beautiful fish and a beautiful figure. With the account of its distribution we differ from our author; "and in this country there is scarcely a river or lake of any extent where this fish does not occur in abundance. It is found in most of the lakes of Scotland."* This will do for the waters of the south; but in the north of England it is a rare river fish, still rarer in the same localities in Scotland, only sparingly met with in the lochs north of the Forth, and in one or two places where it is found north of Perthshire, we can trace its introduction at no distant period. In all the almost countless waters of the northern counties the perch is wanting. Minnow is a deadly bait for large perch. Couch's Serranus (*Ser. Couchii,* Yarr.) dedicated to the indefatigable ichthyologist of Cornwall, though formerly noticed in the Linnean Transactions, is figured for the first time, and has not been identified with any of Cuvier and Valenciennes's species. The details and anatomy of this fish are, however, still wanting, Mr Yarrell having wrought from a drawing only. The weevers, *Trachini,* follow; curious fish, and dreaded by ordinary fishermen. The wound by the dorsal spines of T. draco seems to have varied effect on different constitutions. Some, we have heard, laugh at it, others describe the pain as intense and burning. It is best to beware; and in the French markets, where it more frequently appears than in those of Britain, a penalty is inflicted on those who sell the fish without previously cutting off the dorsal fin, which, as Drayton has it, "buyers seldom see." The lesser species seems common on all our sandy shores, and certainly seldom exceeds five inches in length; in the Solway Frith dozens are taken every tide by the shrimpers. The wounds inflicted by the fin and cheek spines seem only to produce slight inflammation around the wound, with a tingling pain. Of the Gurnards, *Trigla,* six species are figured, and one is dedicated to Bloch to prevent confusion in the application of "Cuculus," which that naturalist and Linnæus had given to different species. Mr Yarrell remarks, that they mostly swim in deep water, and are taken by the traul-nets. The grey gurnard, by far the most abundant on the western coasts of Scotland, often delights on the surface. We recollect observing the sports of shoals of this species when on an excursion to the Western Isles, during a week of beautiful and too calm weather, for it was before steam-boats plied. They were often discovered by their noise, a dull croak or *croon,* whence most probably their provincial name of *Crooner,* or by the ripple or plough of their nose on the surface of the calm sea; thus they would swim for a few yards, and then languidly sink for a foot or eighteen inches, display and stretch their lovely fins, and again rise to the top. Boats were out with hand-lines, almost all were half-full, the men having little to do but bait the hooks and pull up. We resorted to our guns, and killed sufficient for dinner from the deck of the vessel. *Cottus gobio* is rare in Scotland. *C. scorpius* is badly represented; there are two lateral lines strongly denticulated in the figure, which we vainly look for in the fish itself. The *C. bubalis,* on the contrary, is an exquisite figure, full of life and expression. *C. quadricornis* is given, for the first time, as British, from a specimen in the National Collection. *Aspidophorus Europæus* is not uncommon in the Solway. We have two species of *Gasterosteus* new to Britain, one from Ireland, the other from the vicinity of Edinburgh; and from the small size and close alliance of these beautiful, but not very useful fish, we may yet look for other additions. The Mackerel is exquisitely cut. Mr Yarrell's observations on its migration are interesting, and afford a good example of his writing.

---

* Vol. i. p. 2.

"The mackerel was supposed by Anderson, Duhamel, and others, to be a fish of passage; performing, like some birds, certain periodical migrations, and making long voyages from north to south at one season of the year, and the reverse at another. It does not appear to have been sufficiently considered, that, inhabiting a medium which varied but little either in its temperature or productions, locally, fishes are removed beyond the influence of the two principal causes which make a temporary change of situation necessary. Independently of the difficulty of tracing the course pursued through so vast an expanse of water, the order of the appearance of the fish at different places on the shores of the temperate and southern parts of Europe, is the reverse of that which, according to their theory, ought to have happened. It is known that this fish is now taken, even on some parts of our own coast, in every month of the year. It is probable that the mackerel inhabits almost the whole of the European seas; and the law of nature, which obliges them and many others to visit the shallower water of the shores at a particular season, appears to be one of those wise and bountiful provisions of the Creator, by which, not only is the species perpetuated with the greatest certainty, but a large portion of the parent animals are thus brought within the reach of man; who, but for the action of this law, would be deprived of many of those species most valuable to him as food. For the mackerel, dispersed over the immense surface of the deep, no effective fishery could be carried on; but, approaching the shore as they do from all directions, and roving along the coast collected in immense shoals, millions are caught, which yet form but a very small portion compared with the myriads that escape."*

The Dory, *Zeus faber,* is considered rare on the northern shores; Dr Johnston has seen two specimens taken on the Berwickshire coast. *Zeus aper* is added to the Fauna, or rather authenticated to it, a second specimen having occurred in the Bridgewater-market in 1833.——*The Mullets.* Surely there is some confusion here. *The thick-lipped grey mullet,* reckoned so rare by Mr Yarrell as to have been seen only once by Mr Couch, is the common species on the eastern shores of Scotland, where we believe his grey mullet is not known at all, or is, at least, far from common. At the mouths of rivers the former is taken in considerable numbers in autumn, and the figure borrowed from the Italian Fauna, represents this fish with accuracy. But is it not synonymous with the "grey mullet" of Pennant? A comparison of the figures brings them very close. *Mugil labrosus* of Risso is certainly also doubtful as a synonym. *M. curtus,* Yarr. has been taken a second time by M. Baillon in the bay of the Somme, near Abbeville. It is curious that in this instance one specimen only, was also seen.—Valenciennes is of opinion that Mr Yarrell's characters are good. Among the Blennies, *B. palmicornis* of our author, was sent from the Berwickshire coast, and a single specimen procured by Dr Johnston is the only one which has been seen by Mr Yarrell; but what makes it still more interesting, is, that M. Valenciennes, in his last volume, considers the fish here represented as new altogether, and as distinct from the B. palmicornis of the Mediterranean, which has never more than from 33 to 35 rays in the dorsal fin, while that in question, now *B. Yarrelli,* Val. has 50 or 51. The wolf-fish, *Anarrhichas lupus,* does not please us in its figure; the limner has been left to himself, and it would seem that in his eye the sea-cat was imperfect without the head of a real cat. The beautiful gemmeous dragonet we also dislike; it does not exhibit the best style of the art, and looks as left unfinished. We agree with Mr Yarrell in considering it distinct from the sordid dragonet. The *Labridæ* are interesting, and some beautiful figures are given in their illustration. There is an error relative to the *Crenilabrus Cornubicus,* or Goldsinny, but we refer to our 167th page for its correction.

---

* See p. 121.

Of the *Cyprinidæ,* a difficult but most interesting family, we have comparatively few species in the north. The carp, the barbel, the gudgeon, the tench, with many more, are all wanting; the sluggish streams of the south being more favourable for their breeding, and more pleasing to their habits, than the torrents of alpine districts. The common bream will be the most numerous of the group, being abundant in many lakes of southern Scotland, but they all disappear towards the north, and the Grampians perhaps limit their range in that direction. *Abramis brama* and *blicca* are common in the Lochmaben lochs. *Leuciscus idus* we have been unable to trace in Dumfries-shire, though it is introduced on the authority of the late Dr Walker as taken at the mouth of the Nith. *Leuciscus dobula,* Mr Parnell writes us, has been discovered in the Cumberland rivers.——*The Pike.* The lakes of Scotland have produced some 55 lbs. weight.* The weight is rather underrated; we have seen a record of a pike taken in Lochlomond 79 lbs.——The *Salmonidæ.* This most beautiful, but most difficult group is on the whole well represented. The Parr we must criticise a little. The cut is not characteristic, the maxillary bone is far too long, and destroys the peculiar character of the head. The salmon is good, a fine fish: and then such trout! What sport on single gut at the end of Mackenzie's best, in one of Scotland's gullies! Mr Yarrell in his account of the Salmonidæ, has condensed all our previous scattered information, and is in this most useful; he treads his ground otherwise tenderly, and feels like ourselves the want of facts and accurate observancies. We may notice a slight error, however;

---

* P. 387.

" During the early part of the season, the salmon appear to ascend only as far as the river is influenced by the tide, advancing with the flood, and generally retiring with the ebb."—Many salmon ascend during spring; in the Tweed, for instance, thirty or thirty-five miles, and are taken at that distance from the sea clear and silvery, and in full condition, in the months of February and March. There is, also, undoubtedly, a species omitted, which, though migratory, ascends but little way up the fresh water, and which, with its provincial name of salmon trout, has done much towards confusion.* *S. trutta* and this have to be separated, and we would recommend, to determine the characters, and then fix the synonyms; the reverse has hitherto been the common course pursued. Mr Yarrell has, we think, satisfactorily made out two species of Char; the one from the lakes of northern England and Scotland, the other from Wales. Of the *Coregoni* no figure of Mr Thompson's Pollan, *C. pollan*, is given, and we refer to our own page, 247, for its more detailed description. We strongly suspect that this fish is identical with the powan of Lochlomond and some others of our Scotch lochs. Have we any authenticated instance of the gwiniad occurring in Scotland?——*Clupeadæ.* The scaling of the herring is surely represented much too large. This fish takes the artificial fly readily, and is thus caught in the Western Highlands in considerable numbers. The account of the Pilchard from the Couch MSS. will be found very interesting.——*Raniceps trifurcatus* is now found to be not so rare as it was formerly accounted; many instances of its occurrence in various seas having been lately noticed.† A tolerable figure of this fish occurs in Muller's *Zoologica Danica*, under the name of Blennius raninus, which seems to have been overlooked by both Yarrell and Jenyns.—Among the *Pleuronectidæ* it may be remarked, that many species select some particular shell-fish for food; thus the *Dab* was noticed long ago by Peter Colinson to feed on the Pecten obsoletus, a fact since confirmed by Dr Johnston, who informs us, " that he has rarely opened a specimen without finding the stomach full of this pretty shell." The *Platessa microcephala* again feeds much on Chitons, while the clam is seldom found in it. Mr Yarrell describes four species of eels, three of them very distinctly marked; and we can only account for their remaining so long confused, by a reference to the prejudice or disgust that is associated with them, existing even in the south, and as we proceed northward not to be overcome; albeit we Scotch are not famous for squeamishness or delicacy. Of *Acipenser* we have one species only noted, but it is more than probable that some additions will be made ere long to this genus; the species of the continental seas are closely allied, and the occurrence of specimens on the British coasts being comparatively rare, their distinctions have necessarily been scarcely investigated. *Scyllium melanostomum* is added from a drawing of Couch. The volume concludes with the account of two most remarkable creatures, the *Myxine glutinosa,* found chiefly on the east coast, and far from uncommon in the vicinity of Berwick;* and the Lancelet, *Amphioxus lanceolatus,* Yarr, supposed to be the example of lowest organization among fishes—rare and singular. So much for our notes.—We conclude by repeating our recommendation of Mr Yarrell's volumes, and wishing them every success.

---

* The *Salmon Trout* at Berwick is the young of S. eriox, quite a different fish from that now alluded to.

† See a paper in the present number on R. trifurcatus, page 344.

II.—*A Catalogue of British Plants, arranged according to the Natural System, with the Synonyms of De Candolle, Smith, Lindley, and Hooker.* By the Rev. J. S. Henslow, M. A. Professor of Botany in the University of Cambridge. Second Edition, 12mo. pp. 64, 1836.

Were this only a catalogue of names and synonyms, as indicated by the title, we should consider it a useful addition to the library of the British Botanist; and one particularly required at the present time, when changes in nomenclature are so frequent and confusing. But the usefulness of the work is by no means limited to that of a mere compilation of names, the catalogue being made instrumental for conveying important suggestions and improvements in matters interesting to botanists, particularly with regard to those much disputed points, the *indigenousness* and the *specific distinctness* of our wild plants. In reference to the latter question a threefold division is followed, namely, *species,—questionable species,—varieties;* the latter being again distinguished according as they are elevated to the rank of species by one or more of the authorities above named. The author's divisions under the former consideration, or the degree in which the species may have claim to be held indigenous to Britain, are fourfold, and are indicated by particular marks, namely, *species "possibly introduced by the agency of man"*†—"*Naturalized species, certainly not indigenous*"*—*occasionally found wild, but not even naturalized, extinct, or erroneously introduced, and which ought to be excluded from our Floras*" (o);—*admitted natives.* The species included in the *Flora Cantabrigiensis* are distinguished by the addition of a letter (*c*,) and the goodness of their titles to be considered natives of the district, to which this Flora relates, is also indicated.

---

* See a most important and elaborate paper on the Myxoideæ in the Transactions of the Royal Academy of Berlin, by Muller, of which we give an analysis in the present number, p. 402.

On the very debateable question touching the identity or distinctness of species, it is in vain to expect uniformity of judgment, while mere opinion, in contradistinction to fixed rules, is the only guide for our decisions. No fixed rules have yet been discovered or admitted, and we might add, probably with equal truth, that no fixed rules ever will be discovered. The subdivisions of genera, or (what is the same thing,) the union of varieties into species, must rest on the ground of expediency, so long as absolute rules are wanting; and, viewing the question in this light, we unhesitatingly recommend the *catalogue* of Professor Henslow as the best guide for the botanist of Britain; agreeing with the Professor's suggestions in most instances, though inclined to sink the majority of his questionable species into the grade of mere varieties. We do not, however, so fully agree with the manner of classifying the species not indigenous or not found at all in Britain. It appears a more judicious course to join the species "occasionally found wild," with the "naturalized species," both classes being "certainly not indigenous;" and the difference between them being one of degree only, where the degrees are so very difficult to distinguish, that no uniformity of opinion can be hoped for. The classes of extinct and mistaken species are readily separable from the preceding, since these species are not found wild in any sense of the term. They are, indeed, equally different from each other, yet cannot be completely separated; it being now quite impossible to decide whether several of the species, the names of which are still included in our Floras, have become extinct; or whether such names were introduced originally through some mistake about the plants to which they were applied. It would be well to expunge from our descriptive Floras the names of all species not now found wild. The remainder would unite into two classes,—*the wild, but certainly introduced;*—*the established, of uncertain origin.* The subdivisions of these two groups would be merely those of degree. In the former, the extent to which the species have become naturalized; in the latter, the amount of suspicion touching human agency in their introduction, would be the proper criterion. The whole question is still quite open to discussion, and we hope that the example, set by Professor Henslow, will stimulate others to pursue the same subject.

We cannot devote the space necessary to give many examples of our author's views, but the selection of a few genera will render the plan sufficiently intelligible. The genus *Fumaria* has six varieties and species, all of them being marked as belonging to the "possibly introduced" class. *F. officinalis* and *parviflora* are given as admitted species; *capreolata* and *Vaillantii* are held to be questionable species; *media* and *leucantha* are considered to be varieties; the former being distinguished as one admitted to be a species by De Candolle. In the genus *Papaver,* we find *P. nudicaule* considered as a species that ought to be altogether expunged from our Floras; *somniferum* is marked as a species certainly introduced, the other four,—*hybridum, argemone, dubium, rhœas,* rank as possibly introduced species; the maritime form of *Argemone* being named as a variety of that species. *Tormentilla reptans* is sunk into a variety of *T. officinalis,* which latter is properly referred to the genus *Potentilla. Oenanthe apiifolia,* in like manner, is joined to *O. crocata: Veronica agrestis, polita,* and *Buxbaumii* are all admitted species; the latter being considered as certainly introduced. *Potamogeton oblongus* is rejected; *lucens* and *heterophyllus* are united as two varieties, under the name of *proteus; rufescens* and *lanceolatus* are questionable species.

The author gives a numerical table of British species, &c. so far as his Catalogue extends, that is, to the Algæ inclusively. Of the Acotyledones, 1406 species, or 1583 species and varieties together, are enumerated. The Phanerogamæ are thus stated:

	Species,	*or with Varieties.*
Indigenous (including the possibly introduced,)	1382	1650
Naturalized,	57	62
To be expunged?	56	58
Total,	1495	1770

It is deserving of notice, that the author of the Catalogue has altogether discarded the use of capital letters in writing specific names, while in the last edition of the British Flora, the use of capitals in this way has been considerably extended, by adding them to all adjectives expressing the names of countries, as *Gallica, Anglica,* &c. The omission of capitals gives a neater and less crowded appearance to lists of names, but it may be questioned whether their utility in affording hints and information to students, should not be deemed a sufficient counterpoise to any disadvantages arising from their use. We care little for the grammatical, or rather scholastic accuracy of either method; its usefulness is the proper question. But we should be glad to see scientific writers keep uniformity in this respect; and we would remind botanists that they cannot determine this point by themselves; it is a question equally applicable to zoology as to botany.

III.—*The Northern Flora; or a Description of the Wild Plants belonging to the north and east of Scotland, with an account of their places of growth and properties.* By Alexander Murray, M. D. Part I. Edin. 1836. 8vo.

This work is evidently the result of much pains-taking and labour: and, although it does not exactly correspond in its plan with our ideas of what a Flora ought to be, it were to assume a very unbecoming censoriousness, not to admit its great merits which are certain, while what we deem its faults may lie in our own disputable conceptions. It may be characterized as a faithful Flora of the shires of Forfar, Kincardine, Aberdeen, Banff, Murray, and Nairn, with frequent notices of the rarer plants of Ross, Sutherland, and Caithness. The descriptions of the species are original, and derived from specimens gathered in the district, which is as it ought to be; and to each genus there are some useful remarks appended to facilitate the student's attempts in discriminating nearly allied species,—and not unfrequently a note on the validity of certain among them, which may set the experienced botanist to work again. We find besides, a copious list of habitats, and a detail of the medicinal and economical virtues of the herbs, which occupies a space that, in our opinion, might have been better occupied with their present vulgar usages among the natives of these wild Highlands. It is not in a " Flora" that the mediciner—qualified or quack—will seek his remedies, and we botanists are too healthy a race to care for these things.

We refrain from entering into a minute examination of the book at present, — when completed we may find time to write a longer lecture,—but we must now express the pleasure we have had in perusing the notices which the preface contains of Dr David Skene, a naturalist whose merits have been too long buried in forgetfulness. It seems to us, that it would be erecting a just tribute to his memory, were Dr Murray to edit the unpublished works of this learned man, and it were strange lukewarmness to departed worth, were the naturalists of the day not forward to encourage such an undertaking. We call Dr Murray's attention to this suggestion, and beg to express our hopes that it may meet the approval of the friends of Dr Skene. Fac-simile extracts from two of the letters of Linnæus to Skene are appended; we would rather have made our selection from the letters of Skene to Linnæus.

There is an appendix to this part of the Northern Flora, 1. containing "notes from the ancients on certain indigenous species," by Mr Adams, surely the most learned of all country surgeons; and 2. "observations on the agricultural properties of native plants, by the Rev. J. Farquharson." The latter, restored to its original state, (for Dr M. has omitted much of the communication) would form an excellent article in the Journal of Agriculture.

Dr Murray is of opinion that the *Veronica hirsuta* is a mere state, not even a good variety of V. officinalis; while he is inclined to believe, that the Highland *Veronica humifusa*, now generally reckoned a variety of V. serpyllifolia, is a good species,—an opinion to which we are not altogether disinclined, for certainly it is, with its large handsome blossoms, very unlike any prostrate variety of the serpyllifolia which we have gathered in the north of England. We have less hesitation in giving our assent to the propriety of keeping *Potamogeton compressa* and *pusilla* distinct; neither the authority of Hooker nor of Arnott can persuade us to forsake the guidance of Smith in this matter, since we have found his observations exact to nature. *Eriophorum pubescens*, not included in this Flora, we can assure our author, is not a rare plant in Sutherland, growing along with the more common E. angustifolium; and our enthusiastic friend Mr Stables can, if our memory does not greatly deceive us, communicate specimens of the former, gathered during an excursion, the memory of which he will oft fondly recall "when time brings on decay." The *Myosotis secunda* of Dr Murray is surely the same with the M. repens of Don, but in the slight dubiety of their identity, some excuse may be found for the imposition of a new name; there can be none allowed for misnaming our Poa trivialis the *P. scabra*,—and it is certain, that an indulgence in such puerilities of nomenclature is a ready means of rendering nugatory an author's authority in higher matters.

"On the whole," to use the words of our correspondent H. C. Watson, than whom no one is better qualified to give an opinion on the subject, "we can recommend the 'Northern Flora' as an useful addition to our stock of such works, and one that was really needed. To the resident botanist it will of course be acceptable, and the tourist will be supplied, for the first time, with a botanical guide to the north-east of Scotland. Even the distant botanist will feel an interest in the work, from the circumstance of its describing the plants found in the most northern part of Britain, and concerning which there have hitherto existed only scattered notices." Mr Watson mentions that he has a specimen of Eriophorum pubescens from Allangrange in the county of Ross. "Hordeum murinum is stated to be unknown northward of Moray, and in the counties of Aberdeen and Banff. We believe that a locality for this species, near the town of Aberdeen, has been published, though we are unable to refer to it exactly, at the present moment; and another locality for the same species in Sutherland, is mentioned in the "Outlines of the Distribution of British Plants,"—a work which Dr Murray's preface intimates that he has seen."

BIBLIOGRAPHICAL NOTICES.

Catalogue of British Plants. Printed for the Botanical Society of Edinburgh, 1836. Edinburgh, Maclachlan and Stewart, Carfrae. London, Longman and Co. Baldwin.

THE *Catalogue* published by the Botanical Society is an admirable example of the *multum in parvo,* and, looking to its price, we might add, of the *multum* PRO *parvo.* We have here, on one side of a sheet of paper, the fullest list of British plants, both species and varieties, yet published; the authority for every name being added. All the species or varieties, found within sixteen miles of Edinburgh being distinguished by marks indicating the conditions under which they exist, namely, "very common—less common, but of frequent occurrence—abundant in one or two localities—rare—doubtfully native—certainly introduced—others beyond sixteen, but within thirty miles of Edinburgh." This catalogue includes 1636 species and 149 varieties of plants reputed British, and marks 894 species and 18 varieties as appertaining to the tract of country within a radius of thirty miles of Edinburgh. Of these, ninety-one are considered to be introduced species, and forty-three to be doubtful. It is calculated to be useful, not only to local botanists and the members of the society, but to British botanists at large; and the careful and accurate manner in which it has been drawn up, reflects much credit on the individual (or more probably individuals) to whom the preparation of it has been deputed by the society. On one point, however, we think some censure merited by this individual, if not by the society at large. The signs or marks used for indicating the comparative frequency or exotic origin of the species have been most arbitrarily crossed and changed, in utter disregard of the manner in which they have been heretofore applied by others. The asterisk (*) has been long in use to designate an introduced species, but Professor Henslow, we believe, first applied a series of marks in a definite manner, and he has been since followed by others. We certainly think that the Botanical Society should have paid the usual deference to priority, instead of making capricious changes in the use of signs purely conventional, and which could not have been misapplied in the first instance. Confusion is almost sure to arise from this unnecessary change, and not the slightest benefit can accrue from it as a counterpoise to the evil. About thirty names are introduced into the catalogue, as appertaining to species not recorded in the British Flora. Three or four of these may be British plants, and have claim to be ranked as species. All the rest appear to be mere varieties or introduced plants, or to be identical with species familiar to British botanists under other names. *Carex Buxbaumii*, *Polygonum maritimum*, *Alyssum calycinum*, and *Ononis reclinata* appear to have the best claim to exception; yet the two last may have been introduced by human agency, and the second approximates to the maritime variety of *Polygonum aviculare*. The catalogue is well adapted to supply a standard for reference and comparison of lists, and we should be glad to see the whole area of Britain divided into tracts of similar extent, each supplied with its floral catalogue in such a cheap and condensed form. But it must be observed, that the catalogue is to be trusted as authoritative only so far as the plants of Edinburgh are concerned. As a general list of British plants, it includes all that have been *said* to grow in Great Britain and Ireland, and this is a widely different matter from a list of all that really *do* grow there spontaneously. There are two forms of the catalogue; in one, the list of names is printed in long columns on the single side of a large sheet, which can thus be folded up as a post letter; in the other, the sheet is printed in such a manner as to fold up into a fasciculus of sixteen pages.

A History of the rare Species of British Birds, intended as a Supplement to the History of British Birds by the late Thomas Bewick. By T. C. EYTON, Esq. London, 1836. 8vo. Pp. 101. With catalogue arranged, pp. 67. Wood-cuts.

AN extract from the prospectus will be the most correct manner of conveying information regarding the intentions of this desirable addition to the work of our most popular ornithologist. "Since the time of the publication of the last edition of the History of British Birds, by the late Thomas Bewick, many birds have been discovered to be inhabitants, or visitants, of the British Isles; and are consequently not figured in his work. To supply this deficiency is the only aim of the author; and, to the accomplishment of which, he trusts he shall be deemed competent, as he possesses nearly a perfect collection of British birds, and has the assistance of some eminent naturalists in his undertaking."

A supplement to the works of Bewick, exhibiting the additions which from time to time have been made to the list of British birds, has been a desideratum which we find well supplied in the little work before us. The wood-cuts are executed in the best manner of the modern wood engraving, but it would be difficult indeed to come up to the feeling of Bewick, his own draftsman and artist. The letter-press is short, but perhaps sufficient for every purpose, gives the authorities for all the species introduced, and generally the collections in which the specimens are now to be found, and concludes with a catalogue arranged under three heads: 1. What the author considers entitled to the rank of "British birds;" 2. "Extinct species;" 3. "The principal among the introduced species." Of the nomenclature, arrangement, and changes which are proposed, we fear, that, like the ornithologists he complains of, the author has also added and changed unnecessarily.

The following remarks occur in looking over the numbers. *Regulus Ignicapillus* has, we believe, been lately taken in the vicinity of Durham. *Linaria canescens* we have always considered to be the F. borealis, Roux; mentioned with doubt in Temm. Manuel, and again under the above name in the 3me part, p. 264; figured in Vieillot's Gallerie; and we believe it will prove identical with the bird represented by Mr Selby as a variety of the lesser redpole, and mentioned L. P. i. p. 320.—See our "Intelligence" of No. I. for a notice of *Macroramphus griseus,* again killed in Britain. *Sterna arctica* is perhaps the most common species in Scotland; it abounds during the breeding season upon all the rocky islands in the Firth of Forth, from Queensferry to the Fern Islands. The most important bird in the work, on account of its being given as altogether new, is *Turdus Whitei*. It is difficult to give a decided opinion without having seen the specimen, but we think it will prove ultimately to be a missel-thrush in immature or in some variety of plumage. *Turdus varius* may be known in all its states by the deep velvety black of the axillary feathers.*

Herpetologia Mexicana seu Descriptio amphibiorum Novæ Hispaniæ quæ itineribus Comitis de Sack, Ferdinandi Deppe et Ch. Guil. Schiede in Museum Zoologicum Berolinense pervenerunt. Pars prima, Saurorum Species amplectens, adjecto systematis Saurorum prodromo, additisque multis in hunc amphibiorum ordinem observationibus. Edidit Dr Arend. Friedericus Augustus Wiegmann. *Accedunt Tabulæ Lithographicæ Decem, novorum generum typos exhibentes.*—Berolini, 1836.

It is quite unnecessary to say more, than that the execution of the work fully justifies this ample title. The genera in the table are carefully characterized, and the plan is convenient and easily understood, though not so natural in the arrangement of the groups as might be.

The descriptions of the species are full, the plates very accurate, and beautifully coloured.

The work contains the following new genera: *Dracunculus* for some species of *Draco Chamæleopsis*, which scarcely differs from *Corythophanes* of Boie. *Læmanctus*, very like *Polychrus*, but without any pores, and differing in the comparative length of the toes. *Strombilurus*, like *Tropedurus*, but with a keeled back, and larger keeled scales. *Platydactylus*, with slender toes, only dilated at the end.

The plates represent the genera *Heloderma*, *Læmanctus*, *Corythæolus*, *Chamæleopsis*, *Sceloporus*, *Phrynosoma*, *Genhonotus*.

It may be remarked, that *Phyllurus* is rather a sub-genus of *Goniodactylus* than of *Gunynodactylus*, as its toes are compressed and arched, like the typical species of that genus.—J. E. G.

British Fungi, consisting of dried Specimens of the Species described in Vol. V. Part II. of the English Flora; together with such as may hereafter be discovered indigenous to Britain. By the Rev. M. J. Berkeley, M. A. Lond. 1836. 4to. Fasc. i., ii.

This work has nothing to recommend it but its utility; it is neither beautiful nor ornamental, nor are the specimens selected and disposed with the nicety and neatness which might have been wished for by some finical collectors. Notwithstanding this, we are told that the sale of the work has already exceeded the anticipations of its respected author, a fact which is cheering, since it indicates the existence of a greater number of scientific botanists in this country than we were disposed to reckon on, for assuredly Mr Berkeley will number no mere amateur among his subscribers. We cordially recommend the work, which is, indeed, indispensable to every one engaged in the critical study of British Fungi. Each fasciculus contains sixty specimens, pasted on separate pieces of paper, so that they may be arranged hereafter in accordance with the "system" which the purchaser most approves of.

---

* The loan of this bird, for a figure in the new series of "Ornithological Illustrations," will be esteemed a favour.

TRANSACTIONS AND PERIODICALS.—*British.*

The Edinburgh New Philosophical Journal. Conducted by Professor JAMESON. July to October 1836. Edinburgh. A. & C. Black. (Continued from p. 286.)

I. *Zoology.*

AN unimportant Number to the Zoologist or Botanist.——W. V. THOMPSON, Esq., "Memoir on the metamorphosis of the Macrourae or long-tailed crustacea, exemplified in the prawn (Palemon serratus.)" A short paper, stating that changes similar to what the author described in the Brachyuræ, took place in the Macrouræ. In Palemon, the larva, although different from that of the crabs, is nevertheless a Shisopoda, generally of a totally different aspect from the parent animal, and provided at first with a very limited number of cleft members, commonly two or three pairs, perfectly analogous to those of the Zoe. These larvæ also appear to undergo a successive developement, probably embracing several stages. A plate is given.——ROBERT JAMESON, Esq. Assistant Surgeon, 10th Regiment foot, "Notes on the Natural History and Statistics of the Island of Cerigo and its dependencies."—Devoted to the physical appearances of the island, its mineralogy and agriculture.

II. *Botany.*

DR GRAHAM, "Notes regarding some of the plants observed during the last year in excursions from Edinburgh."

The Magazine of Natural History. Conducted by J. C. LOUDON. Vol. ix. Nos. for Sept. Oct. (Continued from p. 288.)

I. ZOOLOGY.

TAYLOR's Notes on natural objects observed while staying in Cuba, p. 449. ——Notices of modes of capturing fishes, p. 457.——TATEM on the elephant's mode of progression, p. 459.——WATERTON on the habits of the Windhover hawk, p. 460.——Couch on the characteristics of a kind of Trigla hitherto confounded with the T. Blochii, p. 463. The fish here described agrees in all its essential characters with the Trigla noticed by Cuvier (Poissons, Vol. iv. p. 67,) under the name of T. Cuculus, *Bl.*; from whose description it differs only in the absence of a dark spot on the first dorsal; a circumstance which, it is remarked by that author, is liable to variation. But it is distinguished from Bloch's gurnard of Mr Yarrell (*Br. F.* p. 50,) in a variety of particulars, of which the chief are, the very great difference of size, the latter "rarely exceeding 1 foot in length, and seldom above 9 or 10 inches;" *—"the whole body rough," whereas this fish is not rougher over the body than the tub-fish is, "the lateral line more strongly serrated than in the grey gurnard," whilst in the fish now under consideration, this part is but faintly, though distinctly, roughened: "Bloch's gurnard" is also distinguished, not only from this, but every other British species, by having the first dorsal ray the longest; a circumstance not noticed by Cuvier in his description, which is very minute, and especially instituted for the purpose of distinguishing it from the neighbouring species; between which and it that circumstance would have formed the most decided character. The air-bladder, the shape and size of which offer good marks of distinction in the different species of Triglæ, is, in this species, 4 inches in length, and 6 inches in circumference, divided anteriorly into two lobes, both conical, but one much larger than the other."——A continuation of Mr Templeton's catalogue of the species of Rayed animals found in Ireland, p. 466.——Johnston's illustrations in British Zoology, being figures and descriptions of Cuvieria Phantapus, p. 472, and of Asterias papposa, p. 474.——Blyth's further remarks on the affinities of the feathered race, and upon the nature of specific distinctions, p. 505.——Remarks on Wood's British Song Birds, p. 515.——Salmon's Notice of the arrival of twenty-nine migratory birds in the neighbourhood of Thetford, Norfolk; together with some of the scarcer species that have been met with during the years 1834, 1835, and 1836, p. 520.——Westwood on a congregation of moths found in the interior of a tree of the False Acacia, p. 528.

II. Botany.

Pamplin on the discovery in Britain of what is supposed to be Gymnadenia odoratissima, p. 475.——Henslow on the production of sugar-candy in the flowers of Rhododendron ponticum; and on the germination of the seeds of an Acacia by boiling them variously, p. 476.

Besides these papers there are numerous short notices, of more or less interest, illustrating the habits of animals, and their instincts.

Companion to Botanical Magazine. By Sir W. J. Hooker, Professor of Bot. in the Un. of Glasgow. Parts xv. xvi. 8vo. Curtis, London, 1836. (Continued from p. 289.)

The account of the esculent plants of Van Diemen's Land, (from the Van Diemen Almanac) is continued from last number. The more remarkable indigenous plants are now noticed. Several of the *acaciæ* produce a useful gum

---

[*] The length of the new species is 26 inches; the girth, 15½.

employed for various purposes.——Acæna sanguisorba or native burnet, with the kangaroo grass, much deteriorate the Van Diemen wool. The thorns of the one, and awny seeds of the other get into the fleece, and cannot be removed by washing; it is recommended, if possible, to have the sheep shearing season over before the seeds of these plants reach maturity.——Arundo phragmites is apparently the same with the European plant; it is abundant, and is useful for thatching. The panicles dye wool green, and the root is said to be useful in liver complaints. Will it not possess the same qualities here?——Banksia australis, "when planted in rows and well clipped, forms a stout and impervious hedge, not surpassed by the hawthorn or holly."——Dacrydium? cupressinum or Huan pine, must be a noble tree, "A height of one hundred feet, and a circumference of thirty, are generally attained by this splendid pyramidal tree."——The Eucalypti are most useful, and are also numerous in species; easily felled and wrought when green, they become hard as oak when dry, and are used for economical purposes. The leaves also exude a sort of "Manna," greedily devoured by birds and insects, and picked up and eaten by the aborigines. A few of the more common or remarkable plants are also noticed, and the paper will be found worthy of perusal either by the popular or scientific reader.——Illustrations of Indian Botany, by Dr Wight and G. A. W. Arnot, Esq. continued, with a figure of Sesuvium repens.——"Botanical information," announces the publication of 2d Fasciculus of Berkeley's Fungi, (See Bibliog. notices, p. 401.) The 3d will be published in March 1st 1837.——Some interesting notes relative to the botany and horticulture of some of the German towns, follow extracts from the correspondence of a friend: and the number is concluded with the commencement of "a brief Memoir of the Life of Mr David Douglas, with extracts from his letters, accompanied by a portrait," which occupies also the whole of No. xvi. We shall wait for its completion, and shall then give some extracts from the adventures of one who has introduced so many beautiful and hardy plants to the gardens of Britain.

TRANSACTIONS AND PERIODICALS—*Foreign.*

Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin. Aus dem Jahre 1834.—Berlin, 1836.

Vergleichende Anatomie der Myxinoiden, der Cyclostomen mit durchbohrtem gaumen. Von Herrn MÜLLER.—*Comparative Anatomy of the Myxinoideæ, &c.*—The author begins by stating the great advantages which zoology has of late years derived from the habit which has arisen of either pursuing the history of some particular organ through each branch of the animal kingdom, or of giving a very accurate anatomical description of some individual, which may serve as a basis for farther comparative observation. The works already published upon the anatomy of the tortoises, the Ornithorynchus, the Cossus of Lyonnet, the Cockchaffer, the Nautilus, &c. are admirable instances of accurate detail. But it is of still more importance that we should be well acquainted with the structure of those animals which stand as it were upon the boundary of some other class, and partake at once of the characters of both. On this account, a knowledge of the anatomy of the Ornithorynchus, and of the Echidna, throws light on the study of the Mammalia; that of the Proteæ and the Cæcilia, on the Amphibia; that of the Cyclostomata, on the fishes; and that of the Lerneæ on the Crustacea. The Cyclostomata are, however, doubly interesting, as they at once occupy the extreme limits of the fishes, and form the link between the vertebrate and invertebrate animals. So great uncertainty has hitherto prevailed with regard to them, that they have been placed in four different classes by naturalists, viz. amongst the Pisces, the Amphibia, the Mollusca, and the Vermes. The Myxine glutinosa was first noticed upon the coasts of Greenland and Norway by Kalm, and was described by him as a species of Lamprey. Linné gave it the name which it still bears, but classed it amongst the Vermes. Modeer placed it amongst the Amphibia. Retzius thought it ought to be placed in the same class as Petromyzon, agreeing with Linné in opposition to Camper, that it comes nearer to Vermes than to Pisces, and that it might without difficulty be separated from the latter. F. O. Müller classed it with the Mollusca, probably on account of the presence of tentacula. In the edition of the Fauna Suecica by Retzius, the Myxine is placed amongst the Pisces. The object of the present elaborate treatise is to obviate these uncertainties, and from a careful anatomical examination, to assign to it its true station in the animal kingdom, as well as to corect some errors and oversights which appear in the remarks of Bloch, Dumeril, Sir E. Home, and other writers upon the subject. Before proceeding to anatomical details, the author gives a classification of the cartilaginous fishes, and particularly of the Cyclostomata, in which the Myxine is placed in conformity to its internal structure. He divides the cartilaginous fishes into four orders, and with regard to the sharks follows Cuvier's arrangement of the genera, though he thinks that, judging from the varieties found in the Mediterranean alone, that great naturalist has not made them sufficiently numerous.

CHONDROPTERYGIA. Skeleton cartilaginous; cranium without sutures.

I. Order. BRANCHIOSTEGA.
  1. Family, CATAPHRACTA—Cartilage of the cranium, and skin of the trunk covered at intervals with cartilaginous tubercles.
    Sturiones. Genus 1. Sturio—with Brandt's subgenera, Huso, Sturio, Sterleta, Helops.
  2. Fam. NUDA—Body without tubercles.
    Spatulariæ. Genus. 2. Spatularia with the subgenera, Polyodon, Lacep. and Planirostra, Rafinesque, Icth. Ohiensis.
II. Order. HOLOCEPHALA.
    Genus 1. Chimæra.
      2. Callorynchus.
III. Order. PLAGIOSTOMATA.
  1. Family. SQUALI. The branchial apertures not fixed to the head.
    Genus 1. Squalus, with Cuvier's subgen. Scyllium, Carcharias, Lamna Galeus, Mustelus, Notidanus, Selache, Cestracion, Spinax, Centrina, Scymnus. *
    2. Zygæna, Cuv.
    3. Squatina. Dum.
    4. Pristis. Lath.

---

* The toothless Sharks, Aodon, Lacep., Massasa and Kumal, Forsk. are still doubtful.

2. Family, Ralæ. The branchial apertures fixed to the head.
Gen. 5. Rhinobatus, Schn. with the subgen. Rhinobatus and Rhina, (the latter doubtful.)
6. Torpedo, with the subgen. Torpedo and Narcine, Henle.
7. Raia. Subgen. Raia, Trygon, and Anacanthus.
8. Propterygia, Otto.
9. Myliobates. Subgen. Myliobates, Dum. and Rhinoptera, Khul.
10. Cephaloptera, Dum. with subgen. Cephaloptera, and one other, not named.

IV. Order Cyclostomata.
1. Family, Hyperoartia. With the nasal aperture closed, and the palate entirely covered with skin
Genus. 1. Petromyzon.
2. Ammocœtes.
2. Family, Hyperotreta. With the palate perforated.
Genus 3. Myxine.
4. Bdellostoma, Nob.

The author then proceeds to describe the characteristic points in his divisions of this fourth order of Cartilaginous fishes, (the Cyclostomata,) and the various new species which he has discovered.

1. Family, Cyclostomata Hyperoartia.
a. with the teeth visible, Dentata. Genus, Petromyzon.
Species, murinus, argenteus, fluviatilis, planeri.
b. without teeth, Edentata.
Gen. Ammocœtes.
———— branchialis.
———— ruber, (doubtful Lac.)
2. Family, Hyperotreta. With the palate perforated. Myxinoidea.
a. with connected external spiracula branchialia.
Myxine, (Gastrobranchus, Bloch.)
——— glutinosa.
b. with separated external spiracula branchialia.
Bdellostoma.
Hexatrema (spec. nov. Nob.) Table bay.
Heterotrema (spec. nov. Nob.) Table bay.
Heptatrema Nob. South sea.
Forsteri, Nob. (Petromyzon cirrhatus, Bloch, Forster.) New Zealand.
Doubtful species. Dombeyi.

The stability of this arrangement of the species depends upon the supposition that the number of the branchial openings and of the teeth upon the tongue remain constant, which future observations must determine. The teeth on the tongue of Myxine glutinosa are very constant. The habits of the last mentioned species are very little known. It is said by Kalm to attach itself to the body of the stock-fish, and to extract nourishment from it. By other writers it is said to penetrate into the intestines of different species of fish.

The Bdellostoma Forsteri is found hanging to the fragments of fish which are placed in nets as bait. Forster says that it frequents rocky places, near the sea shore. While the Myxine frequents the Northern seas, the Bdellostomata are found at the Cape of Good Hope, in the South seas, on the coasts of New Zealand, and of Chili Many of the other Cyclostomata have a still wider range, as well as the peculiarity of inhabiting both fresh and salt water, as the Ammocœtes, Petromyzon fluviatilis, and P. planeri, which occur in the rivers of Europe; the P. marinus, which abounds in all the European seas, has also been taken in fresh water. They have been found in Japan, Tranquebar, and South America. Before he proceeds to the anatomical details, the author gives a general description of the genera Myxine and Bdellostoma, which it is unnecessary to insert. The species belonging to the latter genus are furnished with eyes. The Myxine glutinosa, on the contrary, is totally blind, and forms the only example hitherto known of a vertebrate animal, not possessed of any visual organs. Those animals which are generally called blind are always provided with organs which, at least, enable them to distinguish the light, though the eye itself is covered by a membrane, as Spalax typhlus, Proteus anguinus, Silurus cæcutiens, Acontias cæcus, &c: There are many examples amongst the invertebrata of total blindness, even amongst classes, the generality of which possess the power of vision. Then follows a most accurate description of the osteology of the Myxinoidea, succeeded by a close comparison of their different organs, with the corresponding parts in the cartilaginous, as well as other fishes, and the results of a chemical examination of the bones of each. On exposing a portion of the spinal column of the Squalus Cornubicus to a white heat till all the animal matter was consumed there remained in one instance $41{,}55_{0}$, in another, $42{,}068^{0}_{0}$, of ashes. These contained a very large proportion of phosphate of lime, a portion of sulphate of lime, and evident traces of fluoric acid. Carbonic acid could also be detected. The cartilage of this class of fishes he divides, according to its internal structure, into four classes. The first is called the hyaline cartilage, and is nearly transparent. It is not found in Petromyzon, but abounds in the sturgeons and chimæræ. The second is the tubercular calcareous cartilage, and is most abundant in the Plagiostomata. The third is the cellular cartilage, which is found in the Bdellostomata, and the fourth is termed the ossified cartilage, forming the hardest bones of many of the sharks and rays. On calcining the tubercular cartilage of a large ray, there remained an inconsiderable residuum, which consisted chiefly of phosphate of lime. Fluoric acid was also perceptible, as well as carbonic acid, and sulphur; but it appeared doubtful whether the latter was in the metallic form or as sulphuric acid. A portion of hyaline cartilage, carefully prepared, left a very trifling residuum, which also gave evidence of containing sulphur and phosphorus, combined with lime, but not so as to be separable. An analysis of the bones and cartilage of Squalus peregrinus, conducted by Chevreul, and apparently with greater accuracy than those made by the author, is also given.* We have not room for the details which follow of the comparison between the chorda dorsalis of the Cyclostomata, and that of the higher vertebrata; but the conclusion the author arrives at is, that the spinal column of the Cyclostomata retains the same form and condition as that which we find in the embryos of the higher orders of animals, during the first days of their conception. The following are the gradations which the spinal column undergoes in its structure, ascending from the lower to the higher animals.

---

* Vide Ann. du Musée d'Hist. Nat. Tom xviii.

1. A filamentous cartilaginous tube filled with gelatinous matter, and surrounded with a fibrous skin, the upper side of which forms a second tube, resting on the lower, and which is occupied by the spinal marrow. No rudiments of bone or divisions into joints. The Myxinoidea and Ammocœtes.

2. The same structure as the former, except that on the upper part of the tube there are some cartilaginous processes. Petromyzon.

3. The same structure as the last, with the addition of two cartilaginous basilary processes placed on the under side of the spinal column. Accipenser, Polyodon, Chimæra.

4. The gelatinous tube remains constant, and portions of a fluid gelatinous substance occur between the conical facets of the spine, which articulate with one another. The joints of the spine developed. Fish, Proteæ, Menopome, Cæcilia, and the young of frogs and salamanders amongst the naked Amphibia. (Fœtus of the higher animals at one period of their growth?)

5. The conical facets of the joints of the spine; and the gelatinous matter between them remain stationary, and the spine is either simply divided into joints, (Amphibia, birds during their growth,) or has ligamenta intervertebralia between them. Mammalia, Man.

The author then proceeds to compare the cranium of the Myxine with that of the Petromyzon, and in the following chapter, he compares the cranium of each with the structure of their respective spinal columns, and with the skulls of the Embryos of the higher animals. He describes the gradual development of the skull as we ascend from the lower classes of vertebrata, and considers the crania of Ammocœtes and Myxine to be analogous to those of the fœtus of the higher animals.

He next describes the labial cartilage, and remarks upon the great variety in the formation of the lips in this class of fishes, as well as the different number of lips possessed by various genera, and the uncertainty they have caused amongst authors. The palateal bones and those of the jaws are next described, beginning with the Plagiostomata, and proceeding through the different families down to the Cyclostomata. He then continues his account of the comparative anatomy of the remaining bones of the head, except those of the tongue and the branchiæ, which in the generality of the cartilaginous fishes, as those of the Myxinoidea, vary too much from them to admit of comparison. Their structure, moreover, has already been well described by Rathke and Henle. Having thus concluded the osteology of the Cyclostomata, the author proceeds to describe their Myology, and follows the same plan as before, in first giving the details of their muscular system, and then their comparative anatomy. The descriptions are illustrated by very accurate plates engraved from the author's drawings, without which it is impossible to give an intelligible notion of the various structure in a mere analysis like the present. The muscles of the trunk are first explained, and then those attached to the various bones of the head, and lastly, those of the tongue, which in the Myxinoidea have no resemblance to those of other animals. The organs of breathing in the Bdellostomata and the Myxine glutinosa are then detailed, and the various muscles of the different genera compared with one another; and lastly those of the trunk, with the corresponding ones in the higher orders of animals. The remainder of the treatise is occupied by a curious dissertation on the analogy of the muscles in different parts of the human body, and on the variations observable in different individuals, as well as in animals, such as the occurrence of supernumerary bones, muscles, &c. This is done with a view of establishing data for the analogy, or what may be called the philosophy of the muscular system, which has hitherto been much neglected. Great praise is due to the author of this valuable treatise for the diligence and accuracy displayed in his researches, and for the clearness with which the details are explained. The light which he has thrown upon the history of the Cyclostomous fishes promises to be of great utility, and the scientific manner in which the inquiry is conducted may serve as a model to future writers on comparative anatomy.

Das Leutchen des Meeres. Von Herrn Ehrenberg.—This paper contains the result of numerous observations and experiments made by Ehrenberg upon marine luminous substances, between the years 1820 and 1834. Before entering upon the subject, he gives an historical account of the notices of luminous phenomena which are to be found scattered through the works of various authors, from the days of Aristotle to the present time. The first detailed account of marine light is given by Don Juan de Castro in 1541, in his Journal of a Voyage in the Red Sea. Between that period and 1716, so many navigators had described similar appearances, that in the latter year the Academy of Bordeaux offered a prize for the best explanation of them, and the subject, so far from being set at rest, still continues to excite curiosity. Ehrenberg mentions above 430 authors who have written upon the various kinds of light, both terrestrial and marine, and has drawn up very interesting tables of the various substances, animal as well as vegetable, from which light has been emitted, according to all these writers, forming a condensed history of the whole subject.

The author's first observations were made in 1820, at Alexandria, in conjunction with Dr Hemprich. He there collected a quantity of luminous sea water, which contained quantities of minute shapeless gelatinous bodies, which shone like small sparks when the water was stirred. At Dongala on the Nile, in 1822, he was much struck by the brilliant phosphorescence emitted from the whole skeleton of Heterotis Nilotica, and which he never afterwards saw equalled in any other species either of fresh or salt water fish which he obtained, though he thinks that the arsenical soap which he was obliged to apply in that hot climate without delay, in the preparation of specimens, may have interfered with it. Perhaps the Heterotis is the Dilychnos of Strabo which inhabited the Nile, and whose eyes emitted a singularly brilliant light after death. The author remained stationary at Tor on the Red Sea, for five months, and was frequently engaged in examining the sea water, which was found to be very full of small slimy particles, without any determinate form, often having the edges jagged, and which emitted light on stirring the water in which they were found. They covered the marine plants, corals, &c. which consequently appeared luminous; every stroke of the oar caused them to sparkle, but he was never able to detect any organization in them, and he never could satisfy himself that any of the microscopic animals which he found with them in the water gave out light. They did not unite and form large slimy masses, but were dispersed about in small flakes. Decaying substances emitted no phosphoric light on the shores of the Red Rea, probably owing to the rapidity of their decomposition. The larger species of medusa are rarely met with. The Arabs call them all Kandil al Bahr, or sea lanterns, and it seems that those medusæ which are generally accounted luminous, only emit light at stated periods, as the author had specimens of Andromeda, Cephæa, and Medusa aurita in particular, numberless times in his possession, and watched them both by day and night, but never once saw any light issue from them. In July 1823, he observed near the shore at Moïleh, shoals of Clupea erythræa, which apparently emitted a brilliant light, but he supposes that they only stirred up the water, and that the light proceeded in reality from the before-mentioned luminous bodies with which it abounded. The oars caused at intervals a similar appearance, which tended to confirm his opinion.

During his stay in Arabia, Ehrenberg observed that as long as infusoria were not removed from their native element, or from the substance to which they were attached, they could be transported alive to a considerable distance. Thus he carried a great number of them in a tin box, together with the conferva upon which they were found, from Tor, on the Red Sea, three days journey towards Mount Sinai, exposed to the burning heat of that climate, without their suffering any injury. As long as the confervæ remained green, they retained their vitality. Acting upon this knowledge, in 1830, he caused some bottles of sea water to be sent from Kiel, on the East Sea, to Berlin, containing luminous matter, and found that, on shaking one of them, sparks were clearly visible. The contents of another bottle failed to emit any. He then poured some of the water from the former bottle into a glass, and dropped a little sulphuric acid into it, when several bright flashes of light were seen. He found that the bottle contained several species of living Cyclops, but that they were not luminous. He also found a specimen of Synchaeta Baltica, which Michaelis had considered as luminous, but it did not shew any signs of being so. The really luminous animals were found at the bottom of the bottle. On taking one up in a drop of water on the point of a pen, and adding a portion of sulphuric acid, it emitted a spark, and died directly after. He arrived at the conclusion, that all the light which was emitted from the Kiel water proceeded from many individuals of one species, which he named Polynoe fulgurans, and of which he gives a highly magnified representation. In 1832, he obtained more water from Kiel, when these experiments were many times repeated, and always with the same success; by taking up a drop containing a specimen, and touching it with the acid, the luminous properties of various new species were discovered. In no instance, however, could he perceive any light issue from Synchaeta Baltica, and he accounts for the variation between his own experiments, and those of Michaelis, by supposing that the luminous properties depend upon the fruitful or unfruitful state of the individual at the time. The specimens figured by Michaelis are represented as carrying eggs with them, and as having a succession of them in the ovarium. Those examined by Ehrenberg had the ovarium undeveloped. Not one of the numerous Entomostraca, and especially the genus Cyclops, with which the water was filled, and which greatly surpassed the other infusoria in size, emitted any light. In 1833 the author was at Droebak, near Christiania, in Norway, and obtained several species of luminous animals, and some new ones amongst them, but none were infusoria. The light given out by Oceania microscopica is much clearer, brighter, and more white than the yellow sparks of the infusoria. He was convinced that the light of Cydippe pileus proceeded from the centre where the two ovaria are situated. In 1834 he tried several experiments upon Medusa aurita at Wismar. The sea water in August ranged from 11 to 4° Reaum.

He placed specimens in spring water, in brandy, in sulphuric acid; exposed them to heat; he punctured, cut, and tore them, but in spite of all his efforts, never could discern the smallest spark of light. The ovaria of some were full, and of others undeveloped. The same remarks apply to the undoubted specimens of Medusa aurita which he obtained in the Red Sea. Humboldt, in his voyage to the Brazils in 1814, caught several specimens off Teneriffe, which were peculiarly luminous. On being laid on a tin plate, they emitted light when it was struck. The same phenomenon occurred the moment that the wires of a galvanic battery were joined. Ehrenberg therefore supposes, from the totally different results which he always obtained, that what is called the Medusa aurita of the Atlantic must be a very nearly allied species to that found in the East Sea, and the Red Sea, though hitherto called by the same name. After a violent storm at Heligoland in 1835, numbers of Medusa was thrown ashore, and amongst others, Cyanea capillata, Chrysaora isoscela, Cyanea Lamarckii, and a small new species, to which Ehrenberg gave the name of Cyanea Heligolandia. None of them emitted any light, but thinking that a difference of temperature might have occasioned the disagreement of his own observations with those of Humboldt, they were placed in warm water, but without effect. No infusoria were found in the luminous sea water at Heligoland, but quantities of morsels of gelatinous matter, often torn and ragged, which emitted light, and small gelatinous globules, with jagged edges, occurred similar to those before described, which he obtained in the Red Sea. They all emitted similar sparks, on pouring a portion of brandy, spring water, or hot sea water upon them. They were evidently alive, swam slowly, and amongst them he easily detected numbers of Medusa or Noctiluca scintillans. On shaking the glass containing them a few sparkled, but not all. During his stay at Heligoland, the author often observed, as it were, chains of luminous matter floating about in the sea, some of which, with some difficulty, he succeeded in obtaining. He then proceeded immediately to his house, and examined them without delay. They proved to be masses of luminous Medusa, detached and torn by the violence of the sea, but he found that they continued to emit light, only as long as they retained vitality. Some of these fragments will live for a week, while others die, and are decomposed in a very short time. He has no doubt that the difference of opinion which exists on this branch of the subject has arisen from collectors having delayed to examine such luminous water, till the morning after it was taken, when the torn particles may be already dead, and incapable of emitting any other light than what proceeds from decaying fish, &c. The sea animal which gives out the brightest light of all is the Nereis cirrigera, one of the Annellides. They live together in large masses, in branching sea-weed, and when portions of it are thrown ashore they continue to live, and shine with great brilliancy for many days. It is difficult, from the momentary nature of the spark given out by the Medusa and infusoria, to perceive in what way the light is generated. In the Photocharis, it is very visible. On each side of its feet, it is furnished with two fleshy threads, the upper one longer than the other, and not so thick but strongly resembling each other in their internal structure: a circulation of globules of blood is perceptible in each. The light always proceeds from these cirrhi, and particularly from the under or thicker one, which lies between the rough tubercles of the foot, and the upper one. A few detached sparks first appear on each cirrhus, which gradually increase till they are both illuminated. They then proceed over the back, till the whole animal shines with a greenish yellow light. There certainly is some analogy between this light and electricity, and it is remarkable that the Photocharis is covered with a glutinous slime, which retains its luminous property for a few seconds, after it is detached from the animal. Having closely examined twelve species of luminous animals, the author comes to the conclusion, that the emission of light is an act dependent on their vitality, and which can be repressed or exerted at intervals. Spallanzani and others have asserted that parts of Medusa continue luminous after death, but Ehrenberg accounts for this by supposing that, when examined, they were not really dead. He has often taken up Medusæ that had lain for a long time on the sea shore, exposed to the sun, and returned them to the sea, and, after some time they have recovered, and shewn all the usual signs of vitality. He communicated the results of a farther examination of the structure of Medusæ, (made in 1834) to the Academy, in 1835, but which are not yet printed.

This volume also contains a paper by the same illustrious naturalist, upon the Structure of the Vital Organs, both of Man, and of various Animals. It is illustrated by several plates, containing microscopic representations of these parts, in the human body, and in some of each class of vertebrate and invertebrate animals. He first describes the microscope by means of which the investigation was carried on, and then gives in detail the structure of the brain, the spinal marrow, various nerves, ganglions, and sympathetic nerves, and lastly, takes a critical view of the observations of other writers upon the same subject. It is unnecessary to enter into the details of this paper, as most of them have been for some time before the public. They were read to the Academy in 1833, and were published in Poggendorff's Annalen der Physik, Vol. xxviii. 1833, and Vol. xxxi. 1834.

Uber den Bau der Farrnkräuter (on the Structure of Ferns.) Von HERRN LINK. —Under the general term Fern the author includes the plants belonging to the following three divisions: 1st, The Epiphyllospermae, or those whose seeds are attached to the back of the leaf, including the Polypodiaceae, Hymenophylleae, Osmundaceae, Gleicheniaceae, Marattiaceae, and Ophioglosseae. The 2d division contains the Lycopodiaceae, and Salviniaceæ, in which the seeds are separated from the leaves. The 3d division contains the Equisetaceae. The object of the paper is to describe the internal structure of the stems of these classes, and the author begins with those of the Polypodiaceae, as a type of the first division. They are divided into five classes, Caudex caulescens, C. stolonescens, C. tuberascens, C. arborescens, and C. frutescens. He enumerates several peculiarities belonging to this tribe of plants, which are illustrated by two plates of sections, and concludes by mentioning several statements, made by writers on botany, Mohl, Meyer, Lindley, Cotta, &c. with which his own observations do not accord.

The paper was read to the Academy in January 1834.

Annales des Sciences Naturelles. Zoologie, MM. AUDOUIN ET MILNE-EDWARDS. *Botanique,* MM. AD. BRONGNIART et GUILLEMIN. Avril 1836. (Continued from p. 292.)

I. *Zoology.*

IN this Number, DUJARDIN continues his interesting “*Recherches sur les or-*

ganismes inferieurs." He begins with a defence of the accuracy of his former, and a detail of some new observations, which confirm the opinion he entertains, that there is no such complex digestive apparatus in those infusory animalcules, as EHRENBERG has described,—the presumed stomachs and intestines being merely irregular, empty spaces *(vacuoles)* produced by the penetration of the nutritive matters, or by partial dissolutions *(diffluence)* of the homogeneous body. He then proceeds to describe some new forms of Infusoria which, like the Rhizopodes, shoot out from a fixed portion of the body a certain number of long contractile filaments of extreme tenuity, that are subservient to locomotion. He next discusses the nature of the tail-like filament with which many infusory animalcules are furnished, and which, he says, is an organ of locomotion, and not a proboscis, as EHRENBERG was induced to conclude from some observations he had made on the Peridiniees and Cryptomonadines. DUJARDIN admits, that, as it is homogeneous like the body, and deprived of an epithelium, it may be capable of absorbing from its surface nutritive matters, but that it has not the character or use of a proboscis, he is certain.——The continuation of HITCHCOCK'S "*Description d'empreintes de pieds d'Oiseaux dans le Grès rouge du Massachusets.*"——*Analyse des travaux anatomiques, physiologiques et zoologiques présentés à l'Academie des Sciences pendant les mois de Mars et d'Avril* 1836.—One or two of the notices in this section will be found among our zoological intelligence;—we can only specify here JACQUEMIN'S letters on the respiration of birds; and on the order of the disposition of the feathers on the body of a bird; DUVERNOY on the tongue of the *Cameleon;* GEOFFROY SAINT-HILAIRE on the "embryo of Syra," viz. a fœtus which was vomited by a child of the town of Syra, in 1834, and which has been discussed with an interest which the singularity of the occurrence may well excuse: as a *fact,* it cannot be registered in science, since many doubts hang over the real nature of the substance vomited.——*Memoire sur la famille des Béroides, par* R. P. LESSON. In his preliminary paragraphs, the author collects together what has been ascertained relative to the structure and physiology of this interesting family, and then proceeds to divide it into tribes and genera, characterized with neatness and precision. Under each genus, the species are indicated, and shortly described in the usual manner of systematists. The attempt here made to illustrate the *Beroideæ* is unquestionably an able one, but our knowledge of the species is evidently too limited as yet, to allow us to regard any classification, as other than a convenient table for future study. The author has overlooked Professor Grant's Essay on the Nervous System of Beroë pileus, and on the structure of its cilia, in the Trans. of the Zool. Soc. Vol. i. p. 9.

II. *Botany.*

Memoire sur les Myrsinees, les Sapotees et les embryons paralleles au plan de l'ombilic, par AUGUSTE DE SAINT-HILAIRE.——*Memoire sur la distribution et de mouvement des fluides dans les plantes, par* M. CH. GIROU *de* BUZAREINGUES. A very important contribution to vegetable physiology.——*Observations sur les Saxifraga stellaris et Clusii, par* P. DUCHARTRE, who seems to have proved that the two species are merely variations of the same plant.——*Notice sur quelques Cryptogames nouvelles des environs de Bahia (Brésil), par* J. E. DUBY.

INTELLIGENCE.

ZOOLOGICAL.

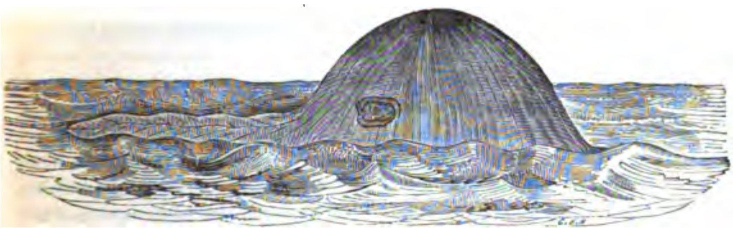
The Leeches and Reptiles of Chili.—It is a remarkable fact that the leeches of Chili are all terrestrial, living in the woods, and never in water. M. Gay assures us that he could not make a botanical excursion without having his legs bitten by these blood-suckers. They crawl upon plants, along trunks of trees, and ascend shrubs, but never approach marshes or rivers; the only one which M. Gay accidentally discovered in these latter habitats is a very small kind of Branchiobolelle, which has the singular habit of living in the pulmonary cavity of the Auricula Dombeii. M. Gay had previously discovered, in the environs of Santiago, another leech of the same genus which lives under the branchiæ of a species of lobster. (The leeches of Chili, in their sylvan manners, resemble the leeches of Ceylon.)

A fact not less interesting is this; in these western regions the reptiles have a tendency to become viviparous. The greater number of those which M. Gay dissected afforded him proofs of this assertion. Not only the harmless snake of Valdivia brings forth living young, but likewise all the pretty Iguanians allied to the genus Leposoma of Spix, and which, from the beauty of their colours, M. Gay provisionally calls Chrysosaurus. Even those species which are oviparous at Santiago are here viviparous. The Batracians furnish some examples of the same fact, although in general they are all oviparous. However, a genus allied to the Rhinella of Fitzinger, consisting of several agreeably coloured species, is constantly viviparous, and consequently adds to the proofs of a fact the more remarkable that all the examples of it are found collected within a radius of two or three leagues only.—*Ann. des Sciences Nat. Avril* 1836, p. 224.

Spirula Peronii.—It is a rare thing to find this common shell with its animal, a fact which, according to MM. Robert and Leclenchet, is in some measure explained by their having discovered that it is the prey and common food of the Physaliæ, which swarm in the same equitorial seas. The figures hitherto published of the Spirula are incorrect; it is a cephalopode which approaches remarkably in form to the shelless Loligo sepiola, having the shell almost entirely imbedded in the posterior part of the body, where there are two natatory expansions of the cloak. The eye is proportionally very large, and without a lid.—*Ann. des Sciences Nat. Avril* 1836, p. 233 and 226.

Huge Marine Animal.—Upon the 22d of June 1834, in latitude 46° 57′, longitude 58° 39′, Captain Neill of the ship Robertson of Greenock, then upon a voyage from Montreal to Greenock, saw the head and snout of a great fish or sea-monster, of which the accompanying sketch or drawing was at the time made. It was first observed about 9° 15′ A. M., on the weather-bow, about four points; and it then appeared like a large vessel lying on her beam ends.

The Robertson was hauled up so as to near it; and running at the rate of eight knots an hour, she at 12 noon got abreast of it, distant about a mile to leeward. On observation at this time it was discovered to be the head and snout of a great fish swimming to windward; and although it was tried to get closer to it, this could not be done, as the fish, without much apparent exertion, kept swimming as fast as the vessel sailed.



Immediately above the water its eye was seen like a large deep dark hole. That part of the head which was above the water measured about 12 feet, and its breadth or width 25 feet. The snout or trunk was about 50 long; and the sea would ripple over one part, leaving other parts of it quite dry and uncovered. The colour of the parts seen was green, with a light and dark shade; and the skin was ribbed, as represented in the sketch.

Scolopax Major.—A fine specimen of *S. major*, (Great or solitary Snipe), was shot on the 8th of September, by Mr Selby, upon the moor near Twizell House. It was in perfect plumage, and very fat, its weight six ounces. Its flight was observed to be different from that of the common snipe *(S. gallinago)*, and somewhat resembled that of the woodcock. It uttered no cry when flushed.—P. J. S.

Northumbrian Noctuadæ.—Among the various nocturnal Lepidoptera, taken this year at Twizell House, Northumberland, are the following, considered of rare occurrence, or which have only been met with in distant localities. *Deilephila elpenor, D. porcellus, Hepialus velleda, Notodonta dromedarius, Leiocampa dictæa, Demas coryli, Nemeophila plantaginis, Triphæna fimbria, Cerigo texta, Lytæa umbrosa, Agrotis valligera, A. suffusa, A. sagittifera, Orthosia litura, Caradrina glareosa, Calocampa exoleta, Hadena remissa, H. adusta, H. genistæ, Euplexia lucipara, Apamea nictitans, A. didyma, Miana literosa, M. strigilis, M. minima, Scotophila porphyrea, Miselia compta, Polia occulta, P. herbida, P. chi, Acronycta menyanthidis, Thyatira batis, Xanthia gilvago, Leucania comma, Cucullia absinthii, Plusia iota, P. percontationis, Heliothis peltigera, &c.*—P. J. S.

BOTANICAL.

Botanical Society of London.—By the advice and sanction of some eminent botanists, it is proposed to form a Society under the above name; the objects of which are, the advancement of Botanical Science in general, but more especially. Descriptive and Systematic Botany, by the reading of original and other papers, on the habitats, particular characters, &c. of Plants, by the formation of a Library, Museum, and Herbarium, for reference and exchange of specimens.

Several gentlemen, friendly to such a society, have held some preparatory meetings, and drawn up regulations for its Government.

It is proposed that ladies be admitted members, with a full participation in the advantages of the Library, &c.—W. M. CHATTERLEY, *Hon. Sec. pro tem.*

BOTANICAL SOCIETY OF EDINBURGH.—April 14, Professor Graham in the Chair. The first meeting held to-day. The Society occupied in making the preliminary arrangements for its future proceedings.

May 12, Professor Graham in the Chair. Mr Carpenter read a communication on the connection between electricity and vegetable life. He commenced by pointing out the differences between the phenomena manifested in living beings, and those which occur in the inorganic world; and argued that their differences arise not from a *change* in the agents immediately concerned in producing the result in both cases, but from these agents being subjected in organized beings to a higher control, that of vitality. He then endeavoured to show the probability that electricity, which is now recognized as the source of chemical affinity, is applied in the vegetable structure to produce the class of compounds usually termed *organic*. The different modes in which electricity is excited during the various processes of vegetable growth, and the experimental indications of its developement, were next enumerated; and the paper was terminated by some hypothetical views regarding the food of plants, based upon the foregoing facts.

Dr Graham stated, that some seeds from a specimen of *Primula*, brought from Norway by Mr Forbes, and named by Somerfeldt *Primula farinosa*, var. *alpina*, had germinated in the Botanic Garden, and two specimens had produced flowers. The examination of these, he said, had satisfied him that they could only be considered a slight variety of *P. Scotica*, differing in no respect from the Sutherland and Caithness-shire specimens, except in the colour of the flower being paler, the tube a little longer, and rather more slender, and the calyx elliptical rather than ovate. Mr Forbes's specimens were gathered in the subalpine country by the Lake of Viger in Lom, and were quite different from *P. stricta* of Horneman, as appeared by specimens of that plant in Dr Graham's Herbarium from Horneman himself.

Mr Tyacke exhibited specimens of *Lamium intermedium*, Fries. lately found by him in several localities in the neighbourhood of Edinburgh, and pointed out the difference between it and *L. incisum* and *L. purpureum*, with the latter of which it seems to have been hitherto confounded.

June 9, Professor Graham in the Chair. Paper by Mr James M'Nab, giving an account of an excursion in the Alleghany mountains in September 1834. The *Rhododendrons*, *Kalmias*, *Azaleas*, and *Andromedas* were particularly mentioned as remarkable for their size and age, Sections of many of these were exhibited, in some of which the concentric circles could be counted to the number of 120.

Mr Forbes read a notice regarding a *Viola* found by him in the Isle of Man and in several localities in the neighbourhood of Edinburgh, which he referred tc

"*Viola ericetorum*, Schrad. *V. canina* γ. Reich. (whose *V. canina* is not that of British and other authors,) perhaps *V. pumila* of Villars, and in all probability *V. montana* of Linnaeus." He stated that it differed from *V. flavicornis* of Smith in many respects; in habit appearing to be intermediate between *V. canina* and *V. lactea*. The form of the filamental glands, he seemed to think, and their relation to the spur, would afford excellent characters for distinguishing the species in the genus *Viola*, although no author appeared to have regarded them in that light.

Dr Balfour exhibited *Ononis reclinata* in flower, raised from seeds brought from Galloway last year.

July 14, Mr Carpenter read some observations on the structural analogies between the animal and vegetable kingdoms, in which he endeavoured to show the correspondence between the principal groups of each; and to apply to plants the laws of development which have been established by the investigation of the structure of animals.

Drs Graham and Balfour gave the following new localities for the plants after mentioned. *Habenaria chlorantha*, near Airdrie, and on the Pentland Hills abundant. *Asperugo procumbens*, field near Luffness. *Specularia hybrida*, near Dirleton and Luffness,—in the latter place abundant. *Trientalis Europaea*, near Dalmahoy Hill, found by Dr Parnell. *Corallorhiza innata*, wood near Currie. *Alyssum calycinum*, discovered in Leicestershire, by the Rev. A. Bloxam.

Philosophia Botanica.—Professor Link intends publishing a new edition of his Philosophia Botanica; and as a separate work, but in illustration of it, he is preparing some plates, to be published under the title of "Icones *Anatomico-botanicæ*."—Comp. to Bot. Mag. ii. p. 76.

Willdenowian Herbarium.—This is arranged on paper of a size between that of the Linnæan (a small foolscap) and other old Herbaria, and the present usual size, (sixteen and a-half inches long, by ten and a quarter broad.) Each specimen is fastened down by strips of paper to a single sheet, and all those that Willdenow had left under one cover, as one species, are carefully put together into a neat double sheet of blue paper. The labels, written by Willdenow, not having been attached by him to individual species, but left loose in the covers, have been fastened to the new covers, which have also a number, beginning from the commencement in the order of his species, and the individual sheets in each cover are also numbered; so that in referring to any specimen in the Herbarium, it is henceforth identified by quoting the number of the specific cover, and that of the sheet on the cover. I have been particular in describing this, because it appears to me to be the most useful way of preserving those Herbaria of distinguished botanists which serve as authorities for their works, and would be far better than the slovenly manner in which Linnæus, Sibthorp's, and others of our Herbier's types are allowed to remain. As to the plants themselves in Willdenow's Herbarium, there are, perhaps, not quite so many as one might have expected; often bad specimens, and unfortunately in many instances, additional specimens have been thrown into the old covers by him without examination, and the labels mixed so that it would require much caution in ascertaining which was the individual specimen the author had in view. But it is very valuable in containing nearly the whole of the plants he described from the Berlin garden, as well as the oriental plants described in his "Species Plantarum," from Gundelshiemer's and Tournefort's specimens, and the Siberian ones from Stephen; the latter are beautiful specimens, and some of them little known, even now, by Russian botanists. This Herbarium also contains a tolerable set of Humboldt's plants.—Comp. to Bot. Mag. ii. p. 75.

Helvella elastica, Eng. Fl. V. ii. 184.—Some fine specimens of this rare fungus have been sent me from the Hirsel woods, Berwickshire, by Miss Elizabeth Bell of Coldstream. Dickson mentions it as a native of Scotland, but the above is the only Scotch *habitat* which has hitherto been recorded.—G. J.

New Botanical Work.—Sir W. Jackson Hooker has commenced a new botanical work entitled "Icones Plantarum rariorum vel minus cognitarum ex herbario Hookeriano selectæ."—The rich collections, made in all parts of the world, which compose the author's herbarium, will ensure an ample supply of subjects; among which, preference will, of course, be given to those that are most remarkable for their novelty, their structure, or their history; particularly from the vast treasures that have been sent to this country by Dr Wallich and Dr Wight, from the East Indies; by Colonel and Mrs Walker from Ceylon; by the Messrs Cunningham, Baxter, Gunn, and Lawrance, in Australia and New Zealand; by Messrs Gillies, Tweedie, Cuming, Mathews, Bridges, &c. in South America; and by Messrs Drummond, Douglas, and Tolmie, in the Northern part of the New World; besides many collections of minor extent, but not of less importance, on account of the rarity of the species, from other celebrated botanists and travellers. An ardent desire to promote the cause of his favourite science has alone induced Sir W. J. Hooker to undertake this work, certainly not the expectation of any pecuniary advantage; for even should the publication meet with the success that his fondest wishes might anticipate, yet the price set upon it is so low as to forbid any hope of profit; and he is anxious to express his acknowledgments to the publishers, Messrs Longman and Co. for kindly guaranteeing him against any positively pecuniary risk in the undertaking. Under their auspices, it is intended that the work shall extend at least to 200 plates, 8vo, to be published quarterly, in Parts, each consisting of 50 beautifully executed Lithographic Plates, and as many leaves of Letter-press, so that the plates and descriptions may be afterwards arranged in whatever manner the possessor may prefer: price 14s. each Part.

MISCELLANEOUS.

Rev. Dr Carey.—Of this eminent missionary and oriental scholar, a Memoir has been recently published* which, in our opinion, is scarcely worthy of the man, and will, in an especial manner, disappoint those who were aware of his love of natural history, and of his great attainments in Indian botany. The only paragraphs in the volume relating to the subject are the three following, written by his son and which we extract entire, certain to give, in doing so, a gratification to many of our readers.

---

* Memoir of William Carey, D. D. late Missionary to Bengal, &c. by Eustace Carey. Lond. 1836. 8vo.

"In objects of nature, my father was exceedingly curious. His collection of mineral ores, and other subjects of natural history, was extensive, and obtained his particular attention in seasons of leisure and recreation. The science of botany was his constant delight and study; and his fondness for his garden remained to the last. No one was allowed to interfere in the arrangements of this his favourite retreat; and it is here he enjoyed his most pleasant moments of secret devotion and meditation. The arrangements made by him were on the Linnæan system; and to disturb the bed or border of the garden was to touch the apple of his eye. The garden formed the best and rarest botanical collection of plants in the east, to the extension of which, by his correspondence with persons of eminence in Europe and other parts of the world, his attention was constantly directed; and, in return, he supplied his correspondents with collections from the east. It was painful to observe with what distress my father quitted this scene of his enjoyments, when extreme weakness, during his last illness, prevented his going to his favourite retreat. Often, when he was unable to walk, he was drawn into the garden in a chair placed on a board with four wheels.

"In order to prevent irregularity in the attendance of the gardeners, he was latterly particular in paying their wages with his own hands; and on the last occasion of doing so, he was much affected that his weakness had increased and confined him to the house. But, notwithstanding he had closed this part of his earthly scene, he could not refrain from sending for his gardeners into the room where he lay, and would converse with them about the plants; and near his couch, against the wall, he placed the picture of a beautiful shrub, upon which he gazed with delight.

"On this science he frequently gave lectures, which were well attended, and never failed to prove interesting. His publication of 'Roxburgh's Flora Indica,' is a standard work with botanists. Of his botanical friends he spoke with great esteem; and never failed to defend them when erroneously assailed. He encouraged the study of the science wherever a desire to acquire it was manifested. In this particular he would sometimes gently reprove those who had no taste for it; but he would not spare those who attempted to undervalue it. His remark of one of his colleagues was keen and striking. When the latter somewhat reprehended Dr Carey, to the medical gentlemen attending him, for exposing himself so much in the garden, he immediately replied, that his colleague was conversant with the pleasures of a garden, just as an animal was with the grass in the field."—P. 577–9.

Dr Carey was born August 17, 1761, and died on 9th June 1834.

OBITUARY.

We have this month to record the deaths of two men whose names will be long remembered by the Zoologist and Botanist—Dr Leach and Mon. A. L. de Jussieu. We shall now only mention the fact that their decease has taken place; but we trust ere long to be able to give some account of their labours in natural science, more consonant to the estimation in which they will continue to be held. Dr Leach died at Genoa of a few days' illness from cholera. De Jussieu expired at Paris; his body bowed under the weight of years; his age was eighty-nine.

EDINBURGH: PRINTED BY JOHN STARK, OLD ASSEMBLY CLOSE.

MAGAZINE

OF

ZOOLOGY AND BOTANY.

ORIGINAL COMMUNICATIONS.

I.—*Observations on the importance of a Local Fauna;—exemplified in the Fauna of Twizel.* By P. J. Selby, F. R. S. E., &c.

It has frequently occurred to the writer, that our native or British zoology might be greatly improved as well as advanced, by well-arranged and carefully-collected Faunas, even where these were confined to districts of very limited extent. The improvement here alluded to, is not the mere extension of the list by the addition of new, or previously undiscovered species, but has in view the additional and interesting information that might be collected and amassed respecting many of those already recorded, in whatever relates to their natural history, taking it in its most extensive signification, and of which, in many cases, we are yet either altogether ignorant, or but very partially informed. English botany, it will generally be allowed, has been greatly advanced and enriched by local Floras, and no good reason seems to exist, why our zoology should not receive equal advantages from Faunas of a similar character. These, however, to be of that service to zoology which is here contemplated, ought to be conducted upon a plan, so as to embrace all those objects that have any reference to, or are in any way connected with the history of the various beings we have in view. Thus the situation, relative height above the sea, and general features of the district to be examined, ought previously to be ascertained, in order to trace whether in any way, or to what extent, these local circumstances affect the distribution of genera and species. Its geological character also should be studied and specified, as this, to a considerable extent, affects and influences its botanical aspect, and consequently must, directly or indirectly, have its effect as regards the distribution of species, particularly that of the invertebrated classes, and upon those insects belonging to the order Lepidoptera, as well as other herbivorous insects which feed upon plants peculiar to certain soils and situations. The habits and manners of every tribe should be watched and diligently observed; the anatomy and peculiarities of individuals should also form a prominent feature in the investigation. In regard to insects, attention should be given to the larvæ, their changes, and other facts connected with this state of being carefully ascertained, the period of appearance, and that of the duration of the imago state regularly noted down, the habitats recorded, and, in short, every thing connected with the economy of life should be made an object of attentive consideration. It is not necessary that the district selected for investigation should be extensive, indeed it would be preferable, provided a sufficient number of zealous naturalists could be found in different parts of the country, willing to undertake the task, that it should be of limited or moderate size, so as easily to be commanded, and its boundaries visited without labour or fatigue. Its living treasures might then be investigated at leisure during the daily walk, affording an object of pursuit at once delightful and instructive; repeated observations and experiments, to verify facts, might be made upon particular species, their habits and economy observed in detail, and under various aspects and conditions; and the investigation, being so entirely under the observer's command, might be extended if agreeable, to more than one department at a time. A comparison of several Faunas, made in different parts of the kingdom, and thus conducted, there can be little doubt, would present results of great interest and importance to zoology. Among many others, the geographical as well as the local distribution of genera and species would be better ascertained, and in all probability, a knowledge of the principal causes which affect the latter accounted for, so that the naturalist in future, upon the mere inspection of a district, might be able to predicate with some degree of confidence, its principal zoological productions. The discovery of many new species might also be expected, and the natural history of all, better ascertained and understood; thus paving the way, by the accumulation of a mass of valuable materials, towards the compilation of a British zoology, superior to any we at present possess. Upon this sort of plan a Fauna has been commenced, embracing a very limited district, and, although it has not been long in operation, the success that has already attended it, as well as the pleasure it affords, and the increasing interest it creates, gives ample encouragement to proceed; and as the progress of such an undertaking may not be altogether unacceptable, it is proposed to give from time to time a list of the species taken in the various departments, with such remarks and observations as may be of interest, or calculated to throw any additional light upon the history of the various objects that come under review.

The district proposed for investigation is situated in the northern part of Northumberland, and contains an area of nearly 700 acres; its distance from the nearest part of the coast is about three miles and a-half; its elevation above the sea from 250 to upwards of 300 feet. The general character of the surface soil may be termed stiff and tenacious, (though it varies in parts) resting upon limestone and the other coal measures, the whole of the district forming a portion of one of the small coal basins so prevalent in this portion of that county. It is intersected by several dells or deans, producing a natural growth of birch, hazel, alder, and other underwood, or else planted, and each with a rill or burn running at the bottom, one of considerable size, and dignified with the name of the Waren. More than a third of the rest of this range is in wood and plantation.

The list of Mammalia, as might be expected from the extent and nature of the district, is limited, and composed of well-known species, common to almost every part of the kingdom, and it therefore offers but little subject for remark. It is as follows:—

Vespertilio pipistrellus, Gmel.
Plecotus auritus, Geoff.
Mustela putorius, Linn.
——— vulgaris, Gmel.
——— erminea, Linn.
Lutra vulgaris, Desm.
Canis vulpes, Linn.
Talpa Europæa, Linn.
Sorex araneus, Linn.
——— fodiens, Gmel.
Sorex remifer, Geoff.
Erinaceus Europæus, Linn.
Mus sylvaticus, Linn.
——musculus, Linn.
——decumanus, Pall.
Arvicola amphibia, Desm.
——— agrestis, Flem.
Lepus timidus, Linn.
———cuniculus, Linn.

In regard to the bats, it is probable there are more species than the two already detected, but the habits of the family render it a difficult matter to obtain specimens for examination.

The ermine or stoat is numerous, more so than the weasel. In severe winters they all assume the arctic dress; in milder seasons, it has been observed that this change does not take place so frequently, or to such an extent in the males as in the other sex. The change of colour takes place in the existing fur, and is not produced by the acquisition of an entire new supply or coat of hair. It is well known that they possess a high developement of the olfactory organs, and frequently hunt down their prey by the scent. This interesting sight the writer has witnessed several times, where the object of pursuit was a leveret or a rabbit. The chase was sometimes of long continuance, although the circuit of operations was confined to a very moderate space, and during the whole of its continuance, it was evident that the ermine trusted more to its nose than to its eyes. It is also a lover of fish, at least of eels, whose remains have been met with when digging the animal out of the burrow, into which it had been traced, but how this slippery prey is captured has not yet been ascertained. The otter is now of rare occurrence, and the last time the tracks of this animal were observed, is about three years since. The mole is very plentiful, finding a secure retreat in the plantations and deans. Varieties of a cream-colour, as well as of a fine silvery grey, are frequently taken in the traps. The water shrew (Sorex fodiens) is in tolerable plenty about the margins of the rivulets. Like its congener, the Sorex araneus, it is often found dead upon the paths. Upon examination, these all appear to be wounded or bitten near the same part of the body; the marks of the teeth by which the bites are inflicted are minute; and there is good reason to believe, that these their death-wounds are received in battles or contests, which take place at certain periods of the year. May not this be a wise provision for keeping within due bounds, a race of animals which appear distasteful to most others, and therefore not much pursued as an object of prey? It has besides been observed, that this mortality only takes place to any considerable extent when the species are more than usually abundant. When diving, and in search of its food among the stones or beneath the surface, the water shrew appears like a moving mass of quicksilver, from the sparkling appearance of the fur, which repels the access or immediate contact of the water. The *Sorex remifer*, which occurs in several of the southern counties, has likewise been detected, a dead specimen having been found upon a path-way, answering in every particular the description of the species, by Jenyns, Bell, &c. The badger, it may be observed, used formerly to have his burrow within the district; and the wild-cat, *Felis catus*, was to be found, not more than twelve years ago, within a distance of three miles.

(To be continued.)

II.—*Observations on the construction of a Local Flora.* By H. COTTERELL WATSON, Esq.

In the first and second numbers of this Magazine, some remarks were made on the increased attention given to the study of

British Botany, and on the number of Floras lately published, descriptive of the vegetable productions of the British islands. While the general Floras have been thus increased in number, and additional species have been yearly added to the lists of our native plants enumerated in them, the department of local botany has been by no means neglected. Perhaps, indeed, we might say of this department, that it has been advanced in more than an equal degree; our local descriptive catalogues having rapidly multiplied during the present century, and the published localities of the less common species of plants having been doubled or trebled in the same space of time. The writing of these appears to be still proceeding briskly enough; and being at once an easy task, and an agreeable employment to botanists, whose professional ties limit their range of observation to one small circuit, the public is likely to continue to receive the benefit of their exertions. But taking such works on the broad ground of public usefulness, or their applicability to the general purposes of science, we have to lament that the authors of them usually contrive to reduce this to its *minimum* of amount, by contracting the circulation of their books, through the ridiculously high prices at which they are published. We do not intend to say that the books themselves are at all overcharged, looking to the very limited demand which can be anticipated for such works; indeed, we feel assured, that the greater number of works of this kind, produce only a pecuniary loss to their authors. What we do condemn, is the expensive form in which the local Floras are written. Half-a-crown, we think, is a very fair price for a local Flora, and we can scarcely conceive a case in which it would be really necessary to double this sum. The authors, however, contrive to swell their works to a size that cannot be sold under four or six times this amount; and many of them are then published with a certain loss. This addition to the bulk of the books is too often made up only of long descriptions of species, with references to figures and to other works, all of which may be found done equally well, if not better, in the general Floras; and from which, in two out of every three cases, they are merely transcribed with the pen, or cut out wholesale with the scissors. In the hope of inducing local botanists to render their exertions more available to science, we shall throw out some hints upon the objects and construction of local Floras and catalogues; and in doing this, we shall take it for granted, that the authors are really desirous to convey information to the public, and to make their works serviceable to others. So very moderate an amount of original talent is imperatively required for constructing a local

Flora, by the ready mode of transcribing from the general works of a similar nature, and so small a share of fame attaches to the most laborious, and even original, exertions in this way, that we cannot attribute a great share of the motives for writing, to the small vanity of making a book, large or little.

First, a local Flora, we take it, ought to relate to a definite area, and not pretend to include a wider space than has been really and well investigated. In neglect of the latter part of this rule, all the negative evidence, or that touching the absence of species, becomes altogether worthless; and, in some instances, it is rendered worse than worthless, by inducing botanists to presume the absence of particular species, within the specified area, contrary to what is the fact. If no definite limits be fixed, both positive and negative evidence are greatly diminished in value, and the pretended local Flora is very little better than an imperfectly got up fragment of a general Flora. *Secondly*, we should have a full list of species and the more remarkable varieties; the nomenclature being adapted to that of the standard Floras which relate to Britain generally; generic and specific characters, descriptions and references, being altogether omitted. The necessity of as full a list of species as possible is founded on the importance of thus marking the absent species, as well as those which do exist within the area of the Flora. Convenience suggests a uniformity of nomenclature with that employed in the general Floras; the synonyms, from two or three of the standard works of this kind, being added to species described in such works under different names. All references to pages, &c. are thus rendered unnecessary, the name itself becoming a clear and unexceptionable reference; while the omission of other references takes off so much from the bulk and cost of the work. The frequent custom of referring to the figures in *English Botany* is altogether unnecessary. Only the local student can need such references, and he finds them all in the general Floras; if, indeed, as often happens, these references be not utterly useless to him, from want of access to the plates cited. It is on the score of their being unavoidably attended by a great augmentation in the prices of the works, without any equivalent advantage, that we would make a clean sweeping away of all descriptions of plants, whether limited to the generic and specific characters, or being of a more detailed kind. To persons who already know the plants, such descriptions are quite unnecessary, and almost every student of botany will possess one of the general Floras, in which the descriptions may be found set forth quite as well. Indeed, as we have intimated, such descriptions are usually transcribed from the general works into the local ones, and the public is thus called on to pay for the same matter over and over again, under different names. Exceptions are of course quite allowable in cases where particular species or varieties have been previously inaccurately or insufficiently described. But if such descriptions and references, as are here objected to, be unnecessary in a local Flora, and serve only to add much to the cost, with little or no addition to the value of the books, the thrusting in of "Introductions to Botany" is a most inexcusable and absurd way of swelling out a local Flora; and it is also an injudicious one, since all unnecessary increase of cost must be attended with a corresponding decrease of sale. And still more absurd is it, for authors to repeat the generic and specific characters twice over, in order to present two arrangements, the Linnean and Jussieuan; as if a mere list of the genera were not amply sufficient to meet such an object! *Thirdly*, we should desire to see the degree of scarcity or abundance of each species mentioned, in as close an accordance as possible with some fixed scale. The scarcity or abundance of the species, *in the tract under consideration*, is what any reader would reasonably expect to be intended, when a local author speaks of a plant being "rare" or "common." Yet it is unfortunately true, that these and other such adjectives, in different instances, are copied from the general Floras, and applied to the species of a local tract in direct contradiction to what is the fact there. *Fourthly*, the time of flowering, and the soil and situation affected by each species, should be given from actual observation. Had we not indisputable proofs that the notices of these points were frequently copied from the general Floras, we might have felt disposed to doubt that writers could be guilty of the slovenly, not to say *dishonest*, practice of copying local particulars, from works not exclusively (or not at all!) referring to the area to which such copied particulars are applied; yet this is done without qualification or acknowledgment. Such a course can scarcely fail of leading the copyists to put forth their own blundering misapplications as actual facts, and of misleading others where the blunders are less glaringly apparent. What can be more unmeaning, or more deceptive, than such indications as "on many moors in the north" occurring in a Flora relating to a tract in the south of England; or, "frequent on mountains" given as the situation of a species found very locally in a tract quite destitute of mountains; or, "chiefly on a chalky soil," for the place of growth of another species, in a county without a yard of chalk through its whole extent! Such errors as these, however, do exist in some works, and arise from the usual situation and frequency of the particular species being copied *verbatim* from a general Flora, and carelessly applied to a local tract in utter defiance of fact. The same sort of mistakes exist as to the times of flowering, through authors copying their intimations of such from the works of others, and then publishing them as if set down on their own observation. *Fifthly*, the general distribution of each species, and the localities of the rarer ones, are to be precisely shown. These are commonly indicated with more care and accuracy than is bestowed upon other matters, in our local Floras; but there is wide room for improvement even here. In addition to stating the known localities for the rarer species, authors should particularly distinguish those places in which they have themselves seen the plants growing, as well as those suspected to be erroneous, or in which the species has become extinct. Facility for procuring specimens is one of the principal advantages to be gained from having the localities especially pointed out. This is little aided by the vague indications of a species growing "near" a particular town or village, unless it be so frequent that a person is almost certain to see it when arriving at the town or village mentioned. For guiding to a very local species, a fixed point adjacent to its locality, with the bearing and distance of the latter from such point, ought to be specified. We are aware that vague directions are sometimes given with the express design of preventing success to one seeking the plant, from the pretended—or, silly if not pretended—fear lest species should be eradicated. They might as well be eradicated as not be found; and of what consequence is it, if a species do disappear from our soil? It is the sheer and selfish babyism of the old *virtuoso*, not the expanded conceptions of the man of science, or the dictates of an enlarged and liberal mind, that whispers so paltry an excuse for studied concealment. *Sixthly*, We should recommend the history of the species to be attended to. Under this head, we would include the possible or probable introduction of the species into the tract under consideration; changes that have occurred in its comparative scarcity or abundance; alterations in character, size, or general appearance, in connection with differences of situation and season. The degree of probability that a species, especially if a rare one, has been originally introduced by human agency, we regret to say, is sometimes misrepresented by local botanists. Botanical writers, too, often exhibit a great desire to swell their lists of species by any means, and to exalt themselves or their friends into discoverers of new species or localities. Strict impartiality is scarcely compatible with the existence of such wishes, and accordingly, we always take the certificates of species being "truly indigenous," "undoubtedly wild," "far from houses," and so forth, with some grains of reservation or qualification.

That all botanists will agree with our views, as to the most eligible form for local Floras, we are not confident enough to hope, or ignorant enough to expect. Those heretofore published exhibit sufficing proofs of striking dissimilarity between the ideas of their respective authors. What appears to us to be one of the simplest and best models for a local Flora, among those hitherto published, occurs in a recent Natural History of Yarmouth, by the brothers Paget. This is merely a list of species, arranged according to the natural method, without references or descriptions; the names being made to correspond with those used in Hooker's British Flora. The usual situations and comparative frequency of the species are almost always intimated; and a few localities, for the rarer kinds, are particularly specified; all such being understood to be inserted on the responsibility of the authors, unless other authority is expressly mentioned. The whole list of the phænogamic plants is thus comprehended in about thirty octavo pages. Woodford's Catalogue of Plants near Edinburgh is also very simple, being a list of species, with one or more localities for each; localities, verified by the author, being distinguished from the others, and the names being adapted to the works of Smith, Hooker, and Greville. The Flora of Bath corresponds with that for Yarmouth, but the English names are added, and also a very few references and descriptions, where particularly necessary. The phænogamic plants, of these two latter works, are contained in about sixty small pages. The Floras of Glasgow and Tunbridge Wells are catalogues of species, having both the technical and English names; also the times of flowering, situations, comparative frequency, and some specified stations. In the former work, the duration of the species is added, and in the latter, references to the figures of English Botany. In these works, the phænogamic plants fill a hundred and fifteen pages. The Catalogue of Anglesea plants, in Welsh Botanology, is nearly on the same plan; but we have here the addition of the Welsh names of plants, and the omission of references to figures, as well as the equally unnecessary notices of the duration of the species. All the preceding may be called *Floral Catalogues;* and they do not in any way claim to be descriptive lists. The Floras of Oxford (Sibthorpe), Bedford, Cambridge, Lanark, Edinburgh, and Berwick, are on a much more extended scale; including descriptions, references, synonyms, and other matters, such as we look for in the Flora of a kingdom. They are, consequently, voluminous in size, and their cost necessarily approaches to the price paid for a general Flora of Britain. The two last have an intrinsic value, in original descriptions, &c. independently of their use as local lists merely. The Midland Flora, and that of Oxford and the adjacent counties (Walker), are further augmented by " Introductions to Botany;" and the Flora of Devon, by repeating generic and specific characters, in two arrangements, is really *two* Floras under one cover. Lastly, the Flora of Northumberland and Durham is expanded into a hundred and forty quarto pages, (including cryptogamic plants), with double columns, although printed in a close small type, and destitute of descriptions or technical characters. The bulk of this work is greatly increased by the name of each species being followed by references usually to four or five works relating to British Botany; ninety-nine in the hundred of such references not being at all required in a local catalogue. The work, however, is really carefully got up, and is a valuable production; although, taking it in our present light of a local catalogue only, much time and talent has been unnecessarily wasted on it. We mean, that the scientific public would have drawn more advantage from a cheap list or Flora, which might have been written with a quarter of the trouble, and published at a quarter of the price. After the preceding remarks, it is scarcely requisite to say, that we give the preference to the floral catalogues first mentioned, and would willingly limit all such works to fifty pages at the outside; feeling assured that half this number would usually suffice, and that all additions go to increase the bulk and price in a much greater ratio than they can add to the usefulness or the circulation. Let it be remembered, however, that we speak only with respect to the general usefulness of such works to the public. When designed chiefly for local circulation, to be used as class works or other special purposes, change of plan may be necessary.

III.—*On the Natural History and Relations of the family of Cuculidæ or Cuckoos, with a view to determine the series of their variation.* By William Swainson, F.R. & L.S., &c. (Continued from page 213.)

The Cuculinæ or Genuine Cuckoos.

As the pre-eminent type of the whole family, a perfect example is seen in the common cuckoo. On examining this bird we observe the following external characters; 1. the bill is considerably wider at the base than it is high; although, beyond the nostrils, it rather suddenly contracts, and becomes compressed; 2. the nostrils are naked, and undefended; opening by a circular aperture, round which is a narrow elevated rim; 3. the upper mandible has a very slight sinuosity at its tip, assuming the form of that notch which is usually seen in dentirostral birds; 4. the wings are of considerable length, nearly reaching to two-thirds the length of the tail, and they are so far pointed, that beyond the fourth quill they begin rapidly to diminish in length; 5. the feet are remarkably short, the tarsus not being longer than the hallux or real hind toe, and the tarsus is thickly clothed with feathers to nearly half its length. Finally, we may remark in this genus, and in nearly all the birds which belong to this sub-family, a decided elongation of the upper cover-feathers of the tail, which are always thick set, narrow, and generally pointed; they are likewise so rigid that they can only be compared to those of the *Ceblepyrinæ* or caterpillar-catchers, forming the corresponding type in the circle of the *Laniadæ*.

Popular interest has been so much confined to the parasitic habits of the cuckoo, that upon many other points of its economy, we are still in comparative ignorance. Hence it is, that we cannot trace, so fully as could be wished, the influence which the structure just described exercises upon the habits and manners of such birds as possess it. We know, however, that all the genuine cuckoos fly with strength and rapidity. Most of them, in fact, are migratory birds. The common species comes to us every spring, from Northern Africa, or Asia Minor, and returns in autumn. This we know from personal observation; for vast numbers arrive in the spring in Sicily and Naples, in company with the Bee-eaters, Orioles, Hoopoes, and other migratory birds; but after remaining a short time, they appear to direct their flight northward, from whence they return in August and September. The form of the nostrils in the typical cuckoos is very peculiar, and I believe that future observations will shew this structure to be intimately connected with their parasitic habits. The nests of those species in which the cuckoo deposits its eggs, we all know, are built in the thickest and most central parts of trees or bushes, to discover which, superior powers of smell have been given to the Toucans (who feed upon the eggs or young,) and, in a less degree, are probably conferred upon the cuckoos, to facilitate their search after a foster-parent for their young. How far this idea may be correct, future observations will determine. Certain, however, it is, that this peculiar-shaped nostril is restricted to such cuckoos as are parasitic, for the whole of the *Coccyzinæ* have the aperture of a lengthened oval shape, or in the form of a slit, and all we know of these birds sanctions the idea that they are not parasitic. The shortness of the feet, in the typical cuckoos, is another important distinction, and leads to the belief that these members are much less used than those of the *Coccyzinæ,* whose habits we have already mentioned when alluding to the cuckoos of South America, all of which are excluded from the group now under consideration. The English cuckoo, no doubt, searches for its food among foliage, but its nature is so shy, that we never have been fortunate enough to witness its mode of feeding. Montagu, however, one of the best authorities we can cite, says, that its principal food consists of caterpillars,* so that it not only possesses the general cast of colours, and much of the structure of its prototypes, the *Ceblepyrinæ,* but actually feeds on the same description of insects.† In both groups, the predominant colours are grey, transversely banded beneath; both have pointed wings, thick set and stiff tail-covers, very short feet, broad bills, and smooth gapes. Their skins, also, are unusually thin. We thus perceive, that all the peculiarities of the typical cuckoos are intimately connected with what we know of their economy, and are in harmony with the analogical relations they bear to their types in other families. The shortness of their feet, indeed, might appear at first to militate against the theory of their representing the grallatorial birds, seeing that these latter are proverbial for a structure totally opposite, having, in fact, the longest legs of any birds in existence; but this objection would be founded on very partial reasoning. It is well known that the *Tenuirostres* represent the *Grallatores;* now the cuckoos represent *both;* but this double representation would not be apparent, if *all* the analogies of their structure were drawn from only one of these groups. Nature, therefore, has combined them, and in a most beautiful manner. The *Tenuirostres* have the shortest feet of all the incessorial tribes, and the cuckoos have the shortest feet of all the *Scansores.* On the other hand, their analogy to the *Grallatores* is preserved by their remarkably long tail-covers, a structure which assimilates them as much to the waders, as their short feet does to the humming-birds. The nature of the food, again, of all three groups, evinces another bond of union. They all live upon the very softest animal substances. Marine worms are the caterpillars of the sands, just as *larvæ* are the caterpillars of trees; while the soft, delicate, dipterous insects upon which the humming-birds occasionally feed, by licking them from the flowers with their tongue, are perfectly analogous to the soft food of the waders, the cuckoos, the caterpillar catchers *(Ceblepyrinæ)*, and the orioles *(Oriolinæ.)*

---

* Ornithological Dictionary. Original edition.

† In an open and muirland district where the cuckoo is very common, we have always found, during May and June, that the stomachs were filled with the remains of caterpillars which fed on the various plants frequent in such localities. Among them those of the *Lasiocampæ* formed a great proportion, and hairy species seem to be preferred.—Edit.

On the geographic distribution of the typical cuckoos, little can be said of a general nature, but what is subject to exceptions when treating of the subordinate groups. Those composing the genus *Cuculus* are restricted entirely to the Old World, and are abundant in those regions mid-way between Europe and New Holland, the two extremes of their latitudinal range. In the other, or longitudinal direction, they extend from Western Africa to the Indian islands. The birds which we now, for the first time, distinguish as the genus *Oxylophus*, are also excluded from the New World, and appear to be confined to the tropical latitudes of Africa and India, where they represent the American genus *Erythrophrys*. The two remaining genera of this division are likewise excluded from the New World, *Chalcites* being African, while *Eudynamys* belongs more especially to Australia and the Indian islands.

In venturing to characterize so many new groups in this family, it is incumbent upon me to lay before ornithologists those reasons which have led to this determination. The present state of our science demands this, for the time has gone by when genera will be received on the unsupported opinion of the mere systematist, without any appeal to acknowledged facts, or palpable analogies; and it is the more necessary to avoid this error in the present instance, because many new genera of the *Cuculidæ* have recently been proposed in the French publications, which I cannot possibly adopt. They appear to me, in almost every instance, forced and artificial, neither characterized by their geographic distribution, or by those variations of structure which are their true distinctions. I may be excused, also, from adopting such names as *Jaccocua, Bubutus, Guira*, &c. as they cannot be admitted into our classical nomenclature, without a violation of those rules to which we are all bound to adhere.

The distinctions by which I propose to characterize the genus *Cuculus* have already been dwelt upon: its exclusive or essential character, however, is to be found in the great breadth and convexity of the bill at the base, and in the short and feathered tarsus: the plumage, moreover, is never vivid, and the upper mandible has a slight or obsolete notch. From the great uniformity of colour which runs through this genus, I am persuaded that several species have been overlooked as varieties of the European cuckoo, some of which I propose to describe hereafter. All these are more or less of a grey or slate-colour, transversely banded, in various ways, beneath, upon a whitish ground. In the *Cuculus nigricans* (Zoological Ill. ii. pl. 7,) however, we have a species, nearly typical in its structure, but aberrant in its colours: the wing begins to have a less attenuated form, the second quill being of a length intermediate between the first and third, instead of, as in our cuckoo, only a little shorter than the third. We look upon this bird, therefore, as conducting us to the genus *Oxylophus*, under which, in a word, I arrange all those birds of M. Vieillot's genus *Coccyzus*, inhabiting the Old World, which have pointed wings. Like the typical cuckoos we have just left, these birds* are likewise parasitic; but they are distinguished by having wings not quite so long, the third quill being shorter than the fourth: the sides of the bill are more compressed, the culmen less convex, and narrower at the base, and the upper mandible is perfectly entire; the tarsus is longer, but it is still inferior to the longest toe. Most of the species have conspicuous crests, the feathers of which are narrow and pointed. The *Oxylophus Levaillantii* (Zool. Ill. ii. pl. 13,) formerly described as an example of the old genus *Coccyzus*, and *Ox. edolius* (Le Vail. Ois. d'Af. v. pl. 207–8,) are both types of this group, and are at once distinguished, as before remarked, from all of the *Coccyzinæ*, by their longer, and more pointed wings.

There are two or three cuckoos of North America, which I feel persuaded are of a distinct type from those just mentioned, although there is some difficulty in determining what are their external characteristics. We are assured by Levaillant, that all the species of *Oxylophus* discovered by him are parasitic; but the American birds to which I now allude (the Carolina and black-billed cuckoos of Wilson,) are not so, for both migrate into the United States for the purpose of breeding, so that, however their external anatomy may assimilate them to the genus *Oxylophus*, their internal structure *must* be different. Their colouring, also, is altogether peculiar, plainly intimating their analogy to the Scansorial creepers, and to many of the undoubted representatives of that family. For the present, the formation of their wings will distinguish them at once from *Oxylophus*, for the third quill is the longest of all; and this makes the wing as much pointed as that of *Cuculus*. Independent of the two species above-mentioned of this new genus (*Erythrophrys,*) there is another found in Brazil.

I feel much more scrupulous in adopting the genus *Chalcites*, than in proposing that of *Erythrophrys*. The beautiful little shining cuckoos, indeed, which have thus been detached, have altogether the appearance of belonging to a different type than those of the genus *Cuculus;* and this idea is strengthened, when we find there are already four or five species, all distinguished at first sight by their diminutive size, and their beautiful golden-green plumage. On the other hand, their actual structure is so completely that of an European group, that I must beg to be understood as being by no means satisfied on the propriety of the separation. For the present, however, I shall adopt this genus, conceiving that these splendid little birds may probably constitute the tenuirostral type of the *Cuculinæ*, in which case they will be analogous to the humming-birds, and nearly all those genera whose plumage is ornamented with metallic colours. The attempt that has been made to define the group by its bill, nostrils, &c. as distinct from the cuckoos, is singularly unsuccessful; while those light shades of difference really existing between *Chalcites* and *Cuculus* have been completely overlooked. *Chalcites*, in fact, has the bill, nostrils, feet, and wings of *Cuculus*, with this difference only, that the tip of the upper mandible is without the slightest indication of a notch: the second and third quill are longer than the fourth, and the feathers of the rump and upper tail-covers, instead of being thick-set and rigid, are of the same degree of density and softness as in ordinary birds. We have seen, that, however dissimilar in their appearance the foregoing groups of the *Cuculinæ* may be, yet that the variation of their external structure is but slight. This consideration has much weight with me in the temporary adoption of M. Lesson's genus *Chalcites*, for we have just seen an example, in *Erythrophrys*, where there is an equally slight variation in external form, yet a most important one in economy and internal organization.

---

* Levaillant's Oiseaux d'Afrique.

The genus *Eudynamys* of MM. Horsefield and Vigors rests on a much better foundation than the last. It is at once distinguished from *Cuculus* by a stronger and thicker bill, the under mandible of which is not only destitute of any curve, but has a decided angle at the under ridge. The feet are also proportionably strong, and are the most robust of all those groups we have yet noticed: the tarsus is longer, and almost naked, while the rump feathers are short and soft. In other respects, such as the wing, nostrils, and tail, this genus agrees with Cuculus. The nostrils, however, judging from dried specimens, appear to be more oval than round. The great size of the bill in this genus induces me to think it is that which represents the Toucans, in which case it will be a fissirostral type.

All the Cuckoos I have yet seen, with more or less pointed wings, and circular nostrils, and whose habits are parasitic, will arrange themselves under one or other of the foregoing genera. Nor are there wanting considerations, drawn from their analogical resemblances in other groups, which render it highly probable that they serve to indicate a circular group. *Erythrophrys*, as the rasorial type, resembles the rufous-winged scansorial creeper; and as it is by this group that the parasitic cuckoos lead immediately to those which build nests; so we have the external characters of *Oxylophus* joined to the economy of *Coccyzus*. *Chalcites*, again, as representing the humming-birds, may be viewed as the tenuirostral type; while *Eudynamys*, with its large bill, and black glossy plumage, will become the representative of the Toucans, and of the fissirostral type. It may be questioned, indeed, whether *Cuculus* or *Oxylophus* follows *Eudynamys*; but I incline to the series in which they are here placed, from the obvious affinity of *Erythrophrys* to *Oxylophus*.

Concentrating the foregoing remarks, we may state the essential external characters of the sub-family I have now attempted to illustrate, in the following table of the

Sub-family Cuculinæ.

CUCULUS, *Linn.*

Bill broad at the base, compressed beyond, the upper mandible obsoletely notched; nostrils circular, with a tumid margin; wings long, pointed, the third quill longest, the second and fourth of equal length; feet slender, very short, tarsi feathered, posteriorly almost to the toes; rump and upper tail-covers long, thick-set, and rigid. Inhabits the old world; parasitic.

Type.—Cuculus canorus, *Lin.*

OXYLOPHUS, *Sw.*

Bill slender, considerably compressed nearly its whole length; upper mandible entire; nostrils ovately round; head crested; wings moderate, pointed, shorter than the tail-covers, the fourth quill longest; tarsi moderate, naked; upper tail-covers long, but not rigid. Inhabits the old world; parasitic.

Type.—Coccyzus. Levaillanti, Sw. Zool. Ill. ii. pl. 13.

ERYTHROPHRYS, *Sw.*

Bill as in *Oxylophus*; head not crested; nostrils oval; wings lengthened, pointed, extending beyond the tail covers, the third quill longest, the second much shorter than the fourth; tarsi moderate, naked. Inhabit the new world, and rear their own young.

Type.—Cuculus Carolinensis, Wilson, iv. 23. f. 1.

CHALCITES. *Lesson.*

Bill and general structure as in Cuculus. Plumage metallic green; upper mandible entire; nostrils circular; wings pointed, the third quill longest, the second much longer than the fourth; tarsi very short, almost entirely plumed; rump and upper tail-covers soft. Inhabits the tropics of the old world; parasitic.

Type—Cuculus auratus, Auct. Le Vail. Ois. d'Af. v. pl. 210, 211.

EUDYNAMYS. *Horsf. and Vig.*

Bill strong, thick, the under mandible not curved, and angulated beneath; upper mandible entire; wings pointed, the fourth quill longest; tarsi much shorter than the longest toe; the upper part plumed; rump and tail-covers soft. Inhabits the old world.

Type.—Cuculus orientalis, Auct.

My next memoir upon this family will contain a similar exposition of the remaining divisions, with the specific characters of several new or obscurely known species.

IV.—*Some account of the Comparative Anatomy of two species of the genus Cercocebus, Geoffroy.* By P. C. EYTON, Esq.

I obtained the two monkeys from which the following notes were made, from Mr Wombwell, when his menagerie was at Shrewsbury, in January 1836; where they died while in his possession. The lungs of both, as well as some of the other viscera, were much diseased, the former adhering in both instances to the parietes.

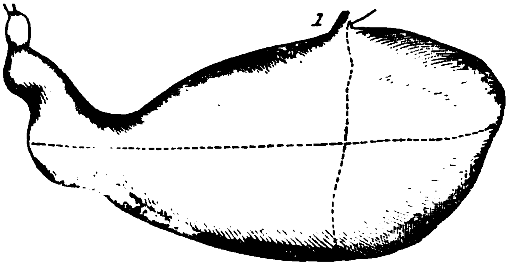
CERCOCEBUS SABÆUS, *Griffiths' Cuvier ;* Simia sabæa, *Linn.* Green-Monkey, *Penn.*

The description of this monkey, which was a male, corresponded precisely with that given in the synopsis of the Mammalia in Griffiths' translation of the "Regne Animal," and also with that in Sir William Jardine's Naturalist's Library. The measurements were as follow: Length from the tip of the nose to the root of the tail, 1 foot 5½ in.; length of the tail, 1 foot 4 in.; length of the intestinal canal from the pylorus to the anus, 14 feet 4 in.; length of the rectum, 3 feet 2 in.:—length of the kidneys, 2 in., greatest diameter, 1 in.:—liver five-lobed:—diameter of the small intestine inflated, 1 in.; above the cœcum, ¾ in.; diameter of the rectum, 1 in.; below the cœcum, 1½ in.; length of the cœcum, from the junction of the small intestine $1\frac{4}{5}$ in. (Fig. 2:)—length of the stomach (Fig. 1)* inflated, $5\frac{1}{2}$ in.; diameter at the junction of the œsophagus, which is the greatest, $3\frac{1}{4}$ in.; length from the œsophagus to cerebral extremity, 2 inches.

Upper jaw, molars 8; incisives 4; canines 2.—Lower jaw. molars 10; incisives 4; canines 2.

The posterior molars in the upper jaw were just making their appearance; in other respects, the dentition agreed with that given of the genus Cercocebus in " F. Cuvier Dents des Mammiferes."

Vertebræ, cer. 7; dor. 12; lum. 8; sac. 2; caud. 20, some of the latter, probably two or three, were wanting.—Ribs, true, 8; false, 4. —Length of ulna, $5\frac{3}{4}$ in., of humerus, $5\frac{8}{10}$ in., of femur, $5\frac{1}{2}$ in., of tibia, $5\frac{1}{8}$ in.



CERCOCEBUS FULIGINOSUS, *Geoffroy*.
White-eyelid Monkey, *Penn*.

The specimen was a young female. The teeth were not all developed, and the white on the eyelids, so remarkable in the adult, was not clear or well defined. In other respects it agreed with the description of authors.

Length from the nose to the root of the tail, 1 foot $3\frac{1}{2}$ in.; length of the tail, 1 foot $6\frac{1}{8}$ in.:—length of the intestinal canal from pylorus to anus, 10 feet 9 in.; length of rectum, 2 feet 9 in.:—diameter of the kidney, 1 in., length 2 in.; liver five-lobed.

In the peritonæum were numerous entozoa, about 30 in number. Diameter of the small intestine 1 in., above the cœcum, $7\frac{1}{10}$ in.; diameter of the rectum, 1 in., below the cœcum, $1\frac{1}{4}$ in; length of cœcum, $1\frac{8}{10}$ in.; length of the stomach (Fig. 4) when inflated, $4\frac{3}{4}$ in.; diameter at the junction of the œsophagus, which is the greatest, $2\frac{3}{4}$ in.; œsophagus inserted about one-third of the whole length from the cardiac extremity. The cœcum, and the adjoining parts of the rectum in this species present rather a sacculated appearance (Fig. 3.)

---

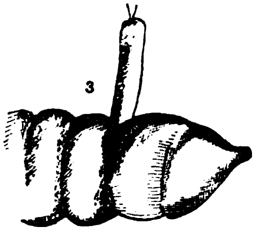
* The dotted lines indicate the direction in which the dimensions have been taken.

Upper jaw, molars, 8; incisives, 2 anterior; canines, 0; milk or first teeth, 2.—Lower jaw, molars, 6; incisives, 2 anterior; canines, 0; milk or first teeth, 4. In the upper and lower jaw the young canines were displacing the two milk teeth adjoining the anterior incisives, the posterior molars were just beginning to appear.

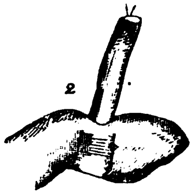
Vertebræ, cer. 7; dor. 11; lum. 7; sac. 3; caud. 23, probably the last caudal vertebra was wanting.—Ribs, 9 true, 3 false.—Length of the ulna 5 in., of humerus 4$\frac{2}{10}$ in., of femur 6 in., of tibia 5½ in.

The spleen, in both species, was similar in shape (Fig. 5,) but in C. sabæus rather larger than in C. fuliginosus.

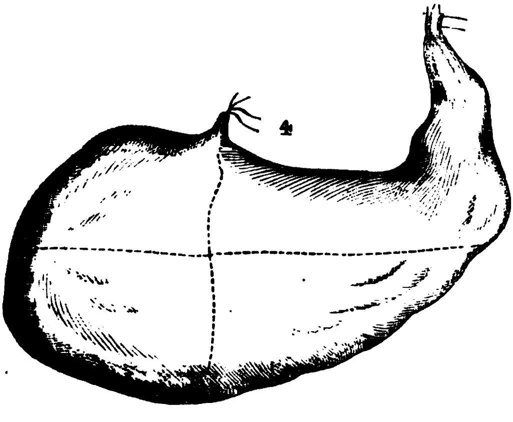
From the above account it will be seen that the stomach is larger in C. sabæus than in C. fuliginosus, the contrary being the case with regard to the Cœca.*



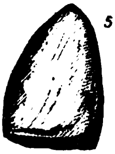
3



2



4



5

---

* It will be useful to compare the figures illustrating this paper with those given in the Transactions of the Zool. Society, i. p. 65, plates 8 and 9 of the sacculated stomachs of the Semnopitheci.—EDIT.

V.—*The Natural History of British Zoophytes.* By George Johnston, M. D. Fellow of the Royal College of Surgeons of Edinburgh. (Continued from p. 247.)

III.—On the Structure and Formation of the Polypidoms.

The existence of a polypidom is not, as has been already mentioned, essential to a polype; nor does it exercise, when present, that great influence over the organization of its architects and tenants which might have been anticipated. Thus the animal of the madreporous Caryophyllæa does not essentially differ from the naked Actinia; and the gelatinous Hydra is a true representative of the tenant of the sheathed Sertulariadæ and Tubularia. No Ascidian polype, however, is ever found detached, and without a polypidom; and it is the same with all our native Astroida, but, perhaps, the clustered animal-flower (Actinia sociata, *Ellis*, Zoanthus, *Cuv.*) of the Carribæan sea, might take its place in this tribe with greater propriety than in any other.

In reference to their composition, Polypidoms may be divided into 1. the stony or calcareous, 2. the membrano-calcareous, and 3. the horny and flexible; but the line which separates these divisions is often as uncertain and debateable as that which is traced between the sister kingdoms. All are composed of the same materials, viz. lime, and a gelatinous or membranaceous substance; and their peculiar characters depend on the different proportions in which the materials are mixed. The calcareous, which are hard and inflexible, and, when dry, assume a white colour, consist principally of carbonate of lime, with a small quantity of the phosphate of the same earth, and the gelatinous matter which cements them into one coherent mass, is in sparing proportion: that proportion is so greatly increased in the polypidoms of the second section, that when the earthy ingredients have been removed by the action of diluted acids, the structure retains its original form, and is, in fact, reduced to the condition of the polypidoms of the third section, which contain no lime, or very little of it, but are formed of a condensed gelatinous membrane, which resembles horn in every essential property.*

These diversities in their chemical composition appear to be of little value, either in a physiological or systematical point of view, for in every order of polypiferous zoophytes, we find calcareous and horny polypidoms. A curious species of Actinia secretes a horny basis, the first rudiment of a madrepore;* but all other madrepores are calcareous: the axis of the Astroida is sometimes of lime, sometimes of horn, and sometimes of membrane: the polypidoms of the Hydroida are flexible and horny in general, and although some calcareous species will be found arranged in this order, yet it must be acknowledged that, as the animals of these species are unknown, or very imperfectly described, the existence of calcareous polypidoms in it is somewhat conjectural; but there is no hesitation in asserting, that the ascidian tribes fabricate productions, some of which are referable to every class that the chemist could devise.

---

* See additional Note, p. 446.

The reader who is not already familiar with the outward forms of our native polypidoms, will most easily obtain a correct idea of them, by examining the figures which will illustrate this work. The very few and insignificant madrepores, or helianthoid polypidoms, which inhabit the British shores, form either short cylinders or reversed cones, having the apex cuped and starred with lamellæ, which radiate from the depressed centre to the circumference. In the major part of the Astroida, or corticiferous polypidoms, there is a central calcareous or horny axis, which may be compared to the wood of a tree, and which is formed by the successive deposition of layer over layer; and this is coated or barked round with a living irritable flesh or jelly, thickened with calcareous matter, which has usually crystallized in the form of spicula. The cells of the polypes are excavated in this soft bark, on the surface of which they open by an aperture, which is always cut into eight rays disposed in a starred fashion, and corresponding to the number of the polype's tentacula; and this aperture can be opened and shut at the pleasure of the inmates. In Alcyonium, although an asteroid, there is no solid axis, but there is an evident tendency to its formation; the materials lie scattered in the form of spicula in the soft gelatinous centre; and in the Cydonium these spicula have become so numerous, that they impart considerable rigidity to the whole mass.

The polypidoms of the Hydraform and Ascidian zoophytes are constructed on very different plans. Were a botanical nomenclature allowable, we might express this difference by saying that those of the asteroid polypes are *exogenous*, seeing they are formed by the deposition of layer over layer, secreted from without; while those of the tribes in question are *endogenous*, and receive all their increment in thickness, from secretions deposited from within. When the material is calcareous or membrano-calcareous, it is moulded into cells or short tubes, which are placed generally in apposition, and in one or two layers or series, and arranged in straight rows in a very regular manner, so that every cell alternates with the one at its side. This arrangement is very obvious in the Flustræ, but it is not less real in Cellepora and Eschara, in which, by the cells being immersed, it is partly concealed. When, on the contrary, the material is horny, it is formed into tubular sheaths encasing the living flesh, jointed at intervals, sometimes of the same calibre throughout, but more commonly dilated at intervals into vases or cups, or cells, in which the proper body of the polype is placed. The manner in which the sheath or tube is divided and branched, is limited in diversity only by the number of the species, which are among the most delicate and interesting of all polypidoms, and pre-eminently imitative of vegetable forms. These forms are of course altogether independent of their animated tenants,—these "have been specifically appointed by Him to do what they have done, and are still effectuating. They are mere instrumentalities at His command. They know nothing of the results they cause, nor mean to perform any of them, nor could of themselves co-operate with each other, nor produce any systematical arrangement, or regulated or orderly effects. It is their Master and Maker who organizes, governs, and guides them to those movements and operations which they perform, and from all others; so that by His directing will they are made to do what we see them effect, and that only, because He restrains and averts them from all else." *

---

* It has been doubted whether this horny base is formed by the Actinia, but I quite agree with Dr Coldstream, that "it is secreted by its base, and that it is as much part of the animal, in fact its skeleton, as are the calcareous axes of Caryophyllæa, Fungia, &c., between which and the true Actinia, it seems to form a well-marked link." See the Edin. New Phil. Journ. ix. p. 238.

The formation of polypidoms has been the subject of considerable discussion. The opinion of Ellis, as we have already seen, was, that they are the result solely of a transudation, or excretion of the constituent matters from the body of the polypes, and this opinion has been maintained recently by Lamarck, and some other naturalists. It rests on the assumption that the polypidom is extravascular and inorganic, so that after its first solidification, it suffers no alteration in form and quality, beyond what is evidently effected by the operation of chemical and mechanical causes: the changes resulting from its increase in size, are not from the activity and pulsion of any inherent principle, but from the super-imposition of additional layers, or from the additions of new cells, or from the prolongation of the tubes, which additions are all coetaneous with the growth and multiplication of the polypes, and the results of new secretions. Linnæus, Pallas, and Baster opposed Ellis, and believed in a vegetative principle, inherent in the polypidom itself, so that its growth was in some measure independent of the living tenant; and various arguments have been brought forward by Bory de St Vincent, which appear to him to demonstrate the truth of this doctrine.

---

* Turner's Sac. Hist. of the World, Vol. ii. p. 71.

Let us forget their reasonings, and take a concise review of the facts. The polypes of Pennatula and Alcyonium occupy cells, which are, as it were, immersed in a pulpous mass, containing a considerable quantity of calcareous spicula, and which appears to be living and organized; for if the naked stem of the Pennatula, or the surface of the Lobularia is irritated, a slow gradual contraction of the whole polypidom apparently proves that the irritation has been felt throughout; and if left undisturbed for a time, the polypidom will be again distended, until its bulk exceeds by two or three times its dimensions in the collapsed state; the increase in size being produced by the introduction of water into the interior, and which has percolated, as has been shown, through the stomach and vasculiform appendages of the polypes. The crust or bark of the Gorgoniæ is identical in structure with the Alcyonium, and, like it, also a living part, capable of converting nutriment to its own nature, of repairing injuries and losses, and of forming new parts; but so far from having anything in common—any affinity with the proper polypidoms of the Hydroida and Ascidioda, this crust is in fact identical with the medullary pulp of the latter, and the very source of what Ellis and Lamarck would consider the inorganic polypidom.* For it is to be observed, that in the Asteroid (which includes Pennatula, Alcyonium and Gorgonia) the polypes and their medium of union are external or cortical; there is strictly speaking no polypidom, but the part which a strict analogy teaches us to call so, is the central solid axis which gives form and firmness to the structure. Now, when we trace the formation of this axis through the various genera, from its first appearance in the form of scattered crystalline spicula, until it graduates into a solid continuous rod, we can scarcely doubt its inorganic and extravascular character; it is the crystallization of calcareous matter excreted by the living polypiferous bark, and once excreted, beyond their power to change it, excepting by the addition of material of the same quality. And to confirm this inference, anatomy lends its aid, for no structure of vessels or of cells in which fluids could circulate, can be detected in the axis; nor can any vessel be shown which can maintain a connection between it and the living pulp.

---

* Bosc takes a different, and a strangely erroneous view: He conjectures that the polypes of these polypidoms may have excretory pores of two kinds,—one kind situated at the posterior part of the animal, to give exit to the juice which is converted into the horny axis; the other kind placed in the collar to excrete the cretaceous or spongoid bark.—Vers, ii. 226.

There are certain discrepancies which might render it doubtful how far the same theory can be safely applied to explain the formation of the polypidoms of the Hydraform and Ascidian polypes: the axis of the corticiferous species is internal,—the polypidoms of the latter are always external; the former is solid,—the latter are tubular sheaths or cells, and occupied with the polypes, or with the living pulp, of which the polypes are merely a developement. But the new position and form of these polypidoms has not altered their real nature, for, as in the preceding, their texture is homogeneous, like horn or shell, in which no vascular or cellular structure, similar to that of organs growing by imbibition and assimilation, can be detected, nor can they be made to evince a sign of the lowest irritability by the application of any stimulus. And further, between the polypes, and their sheath or cells, there is no organical connection, and even no very close apposition in the hydracolous tribe, so that when the polype moves in its cell—whether to retreat within its cavity or expand itself beyond the rim—the cell suffers no change or alteration in shape or capacity; it remains, under all the mutations of the lively and protæan inmate, invariably the same.

Seeing, then, that they are undoubtedly extravascular, the necessary inference seems to be, that the polypidoms in question cannot grow as a plant grows, but must be evolved from and moulded on a living basis,—and can be no other than an exudation from the surface of the living flesh: and, accordingly, it has been ascertained by experiment, that if this fleshy substance is destroyed, no horny sheath or skeleton is formed. In the reproductive gemmule there are two substances, viz. the pulp and the thin cuticle or membrane, the latter of which is the germ of the future arborescent or cellular polypidom: by the growth of the pulp the membrane is distended and moulded into a cell, or pushed upwards in the form of a shoot, in which, after a time, the pulp is arrested in its growth longitudinally, and swells out, and is developed into an animated polype, furnished with tentacula, and with a mouth and digestive organs. Bursting the cell at the point which becomes the future aperture, it there displays its organs, and begins the capture of its prey;[*] for, unlike higher organisms, the polype is at this the period of its birth as large and as perfect as it ever is at any subsequent period, the walls of the cell having become indurated and unyielding, and setting a limit to any further increase in bulk. The growth being thus hindered in that direction, the pulp, incessantly increased by new additions of nutriment from the polype, is constrained and forced into its original direction, so that the extremities of the cell or tube, which have remained soft and pliant, are pushed onwards, the downward shoot becoming a root-like fibre, and the upper continuing the polypidom, and swelling out as before, at stated intervals, into cells for the new developement of other polypes; and just as the fleshy substance extends in either direction, upwards or horizontally, it exudes from its surface " a liquid albuminous matter, —at first soft and transparent, but which after a short time becomes consolidated, and, in proportion to the time it remains, becomes more and more dense." The polypidom then, however like unto certain vegetables in appearance, has, as Ellis said, nothing vegetable about it, but is entirely an animal production, and excreted by the animated pulp which fills its whole interior. Ellis and his followers are only so far wrong, that they have attributed to the polypes themselves what is actually due to the pulp, whether medullary or cortical. The latter is that from which the polypidom is exuded; for, indeed, the cell or crust always precedes the existence of the polypus which is developed within it, while the polypidom is developed from the gelatinous substance of the reproductive gemmules before any polypes begin to be formed, and it continues to be developed and extended by the fleshy mass of the zoophyte, whether polypes are developed in the cells or not. " There is but one life, and one plan of developement, in the whole mass; and this depends not on the polypi, which are but secondary and often deciduous parts, but on the general fleshy substance of the body." [†]

---

[*] " The cell," says Lamouroux, speaking of the Flustra, " is yet closed, but through the transparent membrane that covers its surface, the movements of a polypus may be perceived, who delays not to burst the enclosure of his little habitation; then, exulting in the plenitude of existence, he exercises its functions, and by the assistance of twelve tentacula that surround his mouth, he gives a rotatory motion to the water, and involves in this diminutive whirlpool the animals on which he feeds."—Corall, p. 43.

[†] Grant's Outlines of Comp. Anatomy, p. 14.—We take the opportunity of recommending this valuable work to every student of natural history.

Additional Note.

The only extensive series of experiments we have on the composition of Polypidoms are those of Mr Hatchett, published in the Philosophical Transactions for 1800, and the subsequent progress of zoological and chemical science requires a new investigation of the subject. The general results of Mr Hatchett's experiments are, "that the Madrepores and Millepores are formed of a gelatinous or membranaceous substance, hardened by carbonate of lime, the difference consisting only in the mode in which these materials are combined: that in the Tubipora, Flustra and Corrallina, some phosphate of lime is mixed with the carbonate of lime: that in the Isis the basis is a regularly organized membranaceous, cartilaginous and horny substance, hardened by carbonate of lime, one species only (the Isis ochracea) yielding also a small proportion of phosphate of lime. That the hardening substance of the Gorgonia nobilis is likewise the carbonate of lime, with a small portion of phosphate; but that the matter forming the membranaceous basis consists of two parts, the interior being gelatinous, and the external a complete membrane, so formed as to cover the stem in the manner of a sheath or tube. That the other Gorgoniæ consist of a horny stem coated by a membrane, which is hardened by carbonate of lime. That the sponges are of a nature similar to the horny stems of the Gorgoniæ, and only differ from these and from each other by the quality of texture. And lastly, that the Alcyonia are likewise composed of a soft flexible membranaceous substance, very similar to the cortical part of some of the Gorgoniæ; and in like manner slightly hardened by carbonate, mixed with a small portion of phosphate of lime.

"From this mass of evidence we collect, in general, that the varieties of bone, shell, coral, and the numerous tribe of Zoophytes with which the last are connected, only differ in composition by the nature and quantity of the hardening or ossifying principle, and by the state of the substance with which this principle is mixed or connected; the gluten, or jelly, which cements the particles of carbonate or phosphate of lime, and the membrane, cartilage, or horny substance which serves as a basis, appearing to be only modifications of the same substance, which progressively graduates from a viscid liquid, or gluten, into a gelatinous substance, which again, by increased inspissation, and by the more or less perfect degrees of organic arrangement, forms the varieties of membrane, cartilage, and horn, which, it seems, form the peculiar differences of the several species." Abst. Phil. Trans. i. 25–26. There is a very full analysis of Hatchett's paper in Thomson's Syst. of Chem. v. p. 559, et seq. The paper itself will be found in Phil. Trans. abridg. xviii. p. 706.

IV. THE BRITISH ZOOPHYTES, DIVIDED INTO FOUR ORDERS.

FROM what has been said in the preceding chapters, it seems to follow that the Polypidom, considered by itself, will prove a fallacious guide in any attempt to classify Zoophytes, if it is wished that that classification (and other classification we hold next to valueless) should give a correct representation of the structure of the animated tenants, and distribute these into groups characterized by a uniformity in the leading traits of their anatomy. It is true, that Lamouroux and Lamarck entertained a very different opinion. The former, with feigned regret of the hopelessness of an anatomical method, and with a conviction of its inapplicability if attained, proceeded to arrange and subdivide the class on the ground of differences in the chemical composition of the polypidoms; and the latter, assuming that their cells and corals were an exact cast or mould of the features of the polypes, and hence that a sameness in the structure and form of the one necessarily implied a correspondency in the structure of the other, invented a system which he has, with a complacency that is almost ludicrous, pronounced to be in exact harmony with the march of nature in her creations, or, to use a language more becoming us, with that plan upon which the Author of Nature has apparently proceeded in calling his creatures into existence. We shall analyze these systems hereafter: it is at present sufficient to say, that the result of their labours has been a very preposterous combination of species and genera,—separating, in many cases, what is nearly affined, and, in other instances, assorting together what are most alien. There is indeed no safer course for the systematist than that pointed out more especially by Blainville: the anatomy of the polypes must be the basis of his primary divisions, while in the composition of the polypidoms he may possibly find characters to discriminate and circumscribe the secondary groups in the absence of that more certain knowledge which the comparative anatomist has yet failed to give him. On this principle we now attempt to classify the British Zoophytes, which it is proposed to divide, in the first place, into the following sub-classes and orders.[*]

Sub-class I. RADIATED ZOOPHYTES.

Body contractile in every part, symmetrical; mouth and anus one; always gemmiparous?

Order I. HYDROIDA. *Polypes* compound, rarely single and naked, the mouth encircled with roughish filiform tentacula; stomach without proper parietes; intestine 0; anus 0; reproductive gemmules pullulating from the body and naked, or contained in external vesicles. *Polypidoms* horny, fistular, more or less phytoidal, fixed, external. Marine, excepting *Hydra,* which is lacustrine.

Order II. ASTEROIDA. *Polypes* compound, the mouth encircled with 8 fringed tentacula; stomach membranous, with dependant vasculiform appendages; intestine 0; anus 0; reproductive gemmules produced interiorly. *Polype-mass* variable in form, free or permanently attached, carnose, generally strengthened with a horny or calcareous *axis* enveloped with the gelatinous or creto-gelatinous crust in which the polype-cells are immersed, and which open on the surface in a starred fashion with eight rays. Marine.

---

[*] The classification indicated by Audouin and Milne-Edwards seems in exact harmony with the one here adopted. Recherches pour servir à l'Histoire Nat. du Littoral de la France, Vol. i. p. 73—6.

Order III. HELIANTHOIDA. *Polypes* single, free or permanently attached, fleshy, naked or encrusted with a calcareous *Polypidom*, the upper surface of which is crossed with radiating lamellæ; mouth encircled with tubulous tentacula; stomach membranous, plaited; intestine 0; anus 0; ovaries in thread-like bundles, internal. Marine.

Sub-class II. MOLLUSCAN ZOOPHYTES.

Body non-contractile, and non-symmetrical; mouth and anus separate; always oviparous?

Order IV. ASCIDIOIDA. *Polypes* aggregate, the mouth encircled with filiform ciliated retractile tentacula; a distinct stomach, with a curved intestine terminating in an anus near the mouth; ova internal. *Polypidoms* very variable,—either horny, fistular and confervoid, or calcareous, membranous, or fibro-gelatinous, formed of cells connected and arranged in a determinate and usually quincuncial manner. Marine and lacustrine.

To be continued.

VI.—*Notes on the Hawfinch (Coccothraustes vulgaris, Cuv.) as observed in the vicinity of Epping Forest.* By HENRY DOUBLEDAY, Esq.

BY nearly all our writers on ornithology, the Hawfinch has been considered as only a visitor of the British Islands, and these visits have been supposed to be confined to the winter season, and to occur at rather uncertain periods.

Situate in a locality where these birds abound, I have for some years past given close attention to their habits, and I can safely assert, that they are permanent residents, nor can I perceive any addition to their numbers by the arrival of foreigners at any period of the year.

Their extreme shyness has no doubt contributed to keep us in ignorance of their habits and economy: in this trait they exceed almost any land bird with which I am acquainted, and in open places it it almost impossible to approach them within gunshot.

Their principal food here appears to be the seed of the Hornbeam (*Carpinus betula*, Linn.) which is the prevailing species of tree in Epping forest; they also feed on the kernels of the haws, plumstones, laurel-berries, &c. and in summer make great havoc amongst green peas in gardens in the vicinity of the forest.

About the middle of April they pair, and in a week or two commence nidification. The situation of the nest is various, but is most commonly placed in an old scrubby whitethorn bush, often in a very exposed situation; they also frequently build on the horizontal arms of large oaks, the heads of pollard hornbeams, in hollies, and occasionally in fir trees in plantations, the elevation of the nest varying from five to twenty-five or thirty feet.

The most correct description of the nest which I have seen is in Latham's Synopsis. It is there said to be composed of the dead twigs of oak, honeysuckle, &c. intermixed with pieces of grey lichen; the quantity of this last material varies much in different nests, but it is never absent: in some it is only very sparingly placed among the twigs, in others, the greater part of the nest is composed of it; the lining consists of fine roots and a little hair.

The whole fabric is very loosely put together, and it requires considerable care to remove it from its situation uninjured.

The eggs vary in number from four to six, and are of a pale olive green, spotted with black, and irregularly streaked with dusky. Some specimens are far less marked than others, and I have seen some of a uniform pale green.

The young are hatched about the third week in May, and as soon as they are able to provide for themselves, they unite with the old birds, in flocks varying in numbers from fifteen or twenty to one or even two hundred individuals.

In this manner they remain through the winter, feeding on the hornbeam seeds which have fallen to the ground, and only separate at the approach of the breeding season.

I believe the male has no song worth notice: in warm days in March I have heard them, when a number have been sitting together on a tree, uttering a few notes in a soft tone, bearing some resemblance to those of the bullfinch.'

The plumage of the young bears considerable resemblance to that of the young Greenfinch: the throat is bright yellow; head, neck, and upper parts olive-brown; the under parts paler, each feather tipped with brown.

In winter the bill is a pinkish horn-colour, but becomes deep blue in the breeding season.

Although so common in this neighbourhood, the hawfinch is but little known, which is to be attributed to its shy and retired habits, and I have little doubt it is found in most parts of the kingdom where the hornbeam is abundant.* In this vicinity it seems rapidly increasing, and will probably ere long be equally common with its ally the Greenfinch.

VII.—*On Hybrids produced in a Wild State between the Black-Grouse (Tetrao tetrix,) and Common Pheasant (Phasianus Colchicus.)* By WILLIAM THOMPSON, Esq. Vice-President of the Belfast Natural History Society.†

HAVING lately heard that a hybrid bird, bred between the common pheasant (Phasianus Colchicus, Linn.) and black grouse (Tetrao tetrix, Linn.) had been shot in Wigtonshire, and was preserved for Sir Andrew Agnew, Bart., M. P., through the medium of our mutual friend, Captain Foyrer, R. N., I proposed a few queries respecting it. Sir Andrew, on receiving these, thought an examination of the specimen would prove more satisfactory than a mere reply, and, with the kindest consideration, sent the bird from Lochnaw Castle for my inspection. He states that it was shot in the autumn of 1835 in a wild state at Lochnaw, where it had been seen several times on the wing by persons who imagined it to be a wild turkey. Pheasants and black grouse are numerous in the surrounding plantations; but this is the only bird of the kind that has been observed.

In four instances only am I aware of similar hybrids being recorded. The first is mentioned in White's History of Selborne as a curious bird, shot in a coppice at the Holt, and sent by Lord Stawell for his inspection. Its parentage was not rightly conjectured by Mr White, nor even by several later authors who have endeavoured from his description to make it out. In a note, however, to p. 344 of a late edition of this work (8vo ed. 1833), the Hon. and Rev. William Herbert mentions having seen the specimen in the collection of the Earl of Egremont at Petworth, and speaks decisively to its true parentage. The second specimen was exhibited at a meeting of the Zoological Society of London on the 24th of June 1834, by Joseph Sabine, Esq. who stated that it was bred in Cornwall.‡ The third, shot near Merrington, in Shropshire, was announced to the same Society on the 12th of May 1835, by T. C. Eyton, Esq. by whom it was described in some detail.§ In the preface to a subsequent publication, ("History of the Rarer Species of British Birds,") Mr Eyton informs us, that the brood to which this bird belonged consisted of five individuals, all of which were killed, though two only are preserved. In the same work, (p. 101,) the fourth, and last I know to be on record, is mentioned as having been obtained near Corwen, in Wales, and is in the possession of Sir Rowland Hill, Bart.

---

* This is not the case, nor is it a natural consequence to the abundance of the Hornbeam.

† Read before this Society on Dec. 7, 1836, when the specimen from the collection of Sir A. Agnew, Bart. was exhibited.

‡ Proc. Zool. Soc. 1834, p. 52. § Ibid. 1835, p. 62.

There is not any notice of similar hybrids in the continental works which I have had an opportunity of consulting, and as Temminck is silent on the subject in his comprehensive publications, Histoire Naturelle Générale des Pigeons et des Gallinacés, and Manuel d'Ornithologie de l'Europe, such birds have most probably never been met with on the continent of Europe.

Mr White's description, with the exception of the "legs" being "bare of feathers" applies admirably to the present specimen. He observes, "The shape, air, and habit of the bird, and the scarlet ring round the eyes, agreed well with the appearance of a cock pheasant, but then the head and neck, and breast, and belly, were of a glossy black; and though it weighed 3lb. 3½oz., the weight of a large full-grown cock pheasant,[*] yet there were no signs of any spurs on the legs, as is usual with all grown cock pheasants, who have long ones. * * In the tail were no long bending feathers, such as cock pheasants usually have, and are characteristic of the sex. The tail was much shorter than that of a hen pheasant, and blunt and square at the end. The back, wing-feathers, and tail were all of a pale russet, curiously streaked." With the little that is related of Mr Sabine's bird, the present individual agrees, but differs much both in colour and dimensions from Mr Eyton's specimen. This latter is a female; the one under consideration is presumed to be a male. In the following table its dimensions are contrasted with those of the cock pheasant and black-cock.

	Black Cock.		*Hybrid.*		*Cock Pheasant.*	
	In.	*Lines.*	*In.*	*Lines.*	*In.*	*Lines.*
Length, (total.) . .	20	[†]0	25	3	34	0
——— of tail, . . .			9	0	19	0
——— wing from carpus to end of longest quill,	9	9	10	8	9	9
——— bill above to first feathers on ridge, . .	0	8	1	1	1	0

---

[*] Though the weight of the present specimen cannot now be determined, the size of the body, it may be remarked, is equal to that of the cock pheasant.

[†] To centre of tail.

	Black Cock.		*Hybrid*		*Cock Pheasant.*	
	In.	*Lines.*	*In.*	*Lines.*	*In.*	*Lines.*
Length of bill to rictus, .	1	2	1	5	1	4
———— tarsus, ...	2	2	3	1	3	1
———— middle toe, . .	1	10	2	0	1	11
———————— to nail,	0	8	0	7	0	7
———— hind toe, . .	0	5	0	7	0	8
———————— to nail,	0	4¼	0	4	0	4

Fourth quill longest in hybrid and black-grouse; 3d, 4th, and 5th equal in pheasant.* Tail of hybrid extending 5½ inches beyond closed wing, rounded on expansion, containing 17 feathers, all but the longest being regularly matched, it has probably lost one; 18 is the number both in the pheasant and black-grouse. Bill in form differing only from the pheasant in having the upper mandible less arched. Tarsi and toes in form like the pheasant, but having many more plates; tarsi, bare on the sides and behind, but feathered in front for half their length. Naked skin about the eye equalling in extent the pheasant's, but differing in form both from it and the black-cock's merely appearing in advance of the eye, but broadening out to the extent of half an inch just behind it. There is none above the eye as in the latter bird. Form of the feathers on the head, neck, breast, back, belly, and under tail-coverts, intermediate between the two species; of the scapulars and wings approximating to those of the black grouse. The quills are similar,—those of the tail unlike either species.

In *colour* the hybrid has head, neck, breast, and belly black, each feather when viewed in the light, terminating in a band of a rich claret colour tinged with gold, which decreases in breadth downwards, until at the lower part of the belly it disappears. On laying back the breast feathers, the inner ones exhibit about an inch or less from the tip, a somewhat semicircular band of a cream colour; the inner feathers at upper part of the back similarly examined, shew the cream-coloured marking of the pheasant, the remainder of the feather black, terminating in a claret colour. Upper part of the back, wings, and tail, not resembling either sex of black-grouse or pheasant, but have a soft blending of grey, brownish-yellow, and black, beautifully undulated; quills differing only from the black-cock's in the shafts being blackish-brown. Tail-feathers obscurely undulated with black and brownish-yellow, and transversely barred with black, the bars on the outer feathers occupying as much space as the mottled plumage, their tips black for about 1½ inches; this colour gradually lessens towards the central feathers, the five longest being mottled at their extremities. These present a singular reverse to the longest tail feathers of the pheasant, in which the bars become broader as they approach the end, but in this bird altogether disappear there. Some of the feathers on the wing-coverts have the shaft cream-coloured, with the centre black, ending in a point towards the tip, as in the pheasant; but the cream-coloured band surrounding it in that bird is wanting, and the extremity of the feather is mottled. The lower part of the back and rump has a blending in about equal quantity of black and mottled plumage, each feather terminating in claret colour. The only white in the plumage is a spot on the shoulders similar to that exhibited by both sexes of the black grouse, and a few of the vent feathers partially displaying it. Under tail-coverts black, mottled with rich reddish-brown at their tips. Bill intermediate between the greenish-horny colour of the pheasant and the black of the Tetrao tetrix. Tarsi and toes also intermediate.

---

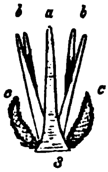
* By pheasant the male bird is meant throughout, when not otherwise expressed.

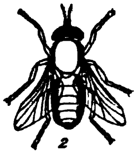
Mr Sabine and Mr Eyton describe their hybrids as bred between the cock pheasant and grey-hen, but that the produce is as likely to occur from the opposite sexes of these species, is indicated by the following circumstance: A black-cock, a few years since, in the possession of my friend, William Sinclaire, Esq. of Belfast, having been kept along with a cock and two hen pheasants, beat and drove away the cock whenever he approached the hens in spring, and, as a brood of pheasants was wanted, had to be removed to another enclosure. This black-cock at the same time displayed towards these hen pheasants all the attitudes by which, in a wild state, the attention of the females of his own species is attracted, and his love-call, so loud as to be heard at a great distance, was almost incessantly uttered. He was a bird of the previous year, taken in autumn by John Sinclaire, Esq. on his shooting-grounds in Ayrshire, after having been " put in" by one of his trained peregrine falcons.

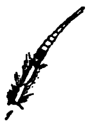
VIII.—*Characters and Descriptions of the Dipterous Insects indigenous to Britain.* By JAMES DUNCAN, M. W. S., &c. &c. (Continued from p. 368.)

GENUS CHRYSOPS, *Meig.*

ANTENNÆ longer than the head, projecting horizontally, somewhat curved upwards at the tip; three-jointed, the two lowest joints cylindrical, equal, and pubescent, third elongate and tapering, divided into many rings, the four near the apex being generally most distinct, (Fig. 1.); palpi pubescent, the first joint short, second long, and somewhat conical in both sexes, (Fig. 3, *c*); proboscis horizontal in the male, vertical in the female, rather slender, the terminal lobes elongated; labrum long and pointed (Fig. 3, *a*.); eyes golden green, with spots and bands of purple; ocelli three; tibiæ terminating in two minute spines; wings half open when at rest, the anal cell scarcely closed at the inner margin.







Besides several attributes peculiar to itself, the genus Chrysops (so named on account of the brilliancy of the eyes,) combines some of the separate characters of the preceding and following genera, and thus forms a connecting link between them. Its affinity, however, to Hæmatopota is much greater than to Tabanus, as it possesses, in common with the former, cylindrical antennæ, palpi nearly alike in both sexes, and spines at the extremity of the tibiæ, besides presenting some other minor points of agreement. Its most striking peculiarities are, the annulated appearance of the whole of the terminal joint of the antennæ, the presence of ocelli, and the obscure coloration of the wings, relieved by a few transparent pale-coloured patches. About a dozen species are known to inhabit Europe, but of these a very small proportion occur in Britain. In habits they are similar to the Tabani, and the larvæ, like those of the group just named, are said to live in the earth; but this fact comprises all that is known in relation to their early condition.

CHRYSOPS CÆCUTIENS. (s.)

Meig. Latr. Macquart, Steph.—Tabanus cæcutiens, *Linn. De Geer*, vi. 224. pl. 13, fig. 3. *Donovan*, iv. pl. 131.

Male: black and pubescent; hypostome yellow, but the ground colour almost concealed by two large shining black spots; eyes with two dark-purple bands, the uppermost interrupted; forehead black: thorax with reddish-yellow pubescence on the sides; abdomen black, the second segment with a fulvous spot on each side; under side dark brown, the two first segments yellow, with a brown central streak: legs black; wings brownish-black, with a small hyaline spot near the middle, at the side of the discoidal cell, a light-coloured triangular spot before the apex, and a streak of the same near the base.

Female: hypostome and forehead greyish-yellow, each of them with two shining black glabrous callosities; antennæ and palpi black; the radical joint of the former inclining to fulvous at the base; eyes golden-green, changing with the light, and marked with several angular spots of purple; thorax shining black, clothed with reddish-yellow hairs, particularly on the sides, and having two faint abbreviated grey lines in front: abdomen with the first segment black, having a yellow spot on each side; second yellow, with two diverging black lines in the middle, enclosing a triangular yellow spot; remainder black with yellow hairs: halteres and legs black, the basal joint of the hinder tarsi obscure red; wings brownish-black, with a large pale hyaline spot at the base, not reaching the anterior margin, and another at the apex. 4—4½ lines (Fig. 2.)

The above description applies to the most ordinary states of this fly, but it is one of the kinds which appear in a great variety of aspects. In the state most widely removed from the above, it is of small size (3½ lines,) clothed with long pubescence, especially on the hypostome and two lower joints of the antennæ, and the colour *entirely black,* the pubescence on the belly alone inclining to ferruginous. Several intermediate varieties occur, connecting these two extremes, a circumstance which disinclines us to regard any of them as specifically distinct. These varieties are almost exclusively males, the characters of the other sex being much more constant. To some of them may be referred the insects described under the names of Chry. lugubris and viduatus, Fab., C. consimilis, Steph. &c.

The females of this pretty fly are of occasional occurrence seemingly in all parts of Britain, and in many parts of England they may be regarded as common. The males are comparatively seldom met with, and both sexes become scarcer as we advance northwards. Of the black variety we have seen only one or two examples, males, which were taken in Sutherlandshire and in the south of Scotland. "Cambridgeshire, males rare," *Rev. Leonard Jenyns.* "Stocton-upon-Tees, Cambridge," *Charles C. Babington, Esq.* "Wittlesea Mere, &c. &c." *T. C. Dale, Esq.* "Dumfries-shire, vicinity of Jardine Hall, common." *Sir William Jardine, Bart.*

CHRYSOPS RELICTUS.

Chrys. viduatus, *Fallen. Meig. Klass.* tab. ix. fig. 12. Tabanus cæcutiens, *Panz. Fauna Germ.* xiii. 24. Tab. nubilosus, *Harris Expos.* pl. vii. fig. 5.

About the size of the preceding species, or somewhat larger: hypostome and forehead yellow, with black spots, as in *C. cæcutiens;*

antennæ black, with the base yellow; palpi testaceous: thorax and scutellum greyish, the former with three black lines on the back, and the sides yellow: abdomen yellow, the first segment black in the centre, the second with two connivent black spots of a triangular shape, the remainder black, with a yellow posterior border, which is dilated in the middle and on the sides; under side dull yellow, the base of the segments suffused with brown: thighs dark brown; tibiæ rufous, the anterior with the upper half brown; tarsi likewise rufous, the whole of the anterior pair and the apex of the joints in the rest dusky.

Rather a scarce species, at least in the more northern parts of the country; it is common in the north of France, and will probably not be rare in some of the southern counties of England. "Occurs in Cambridgeshire, but is much less common than *C. cæcutiens.*" *Rev. Leonard Jenyns.* "Cambridge," *Charles C. Babington, Esq.* "Near London," *Stephens's Catal.* "Ireland." *A. H. Haliday, Esq.*

CHRYSOPS PICTUS.

Meig. Zwei. ii. 70. *Macquart,* Dip. du Nord de la France, 166.—Chry. viduatus, Var. *Meig. Klass.* i. 158, 2.

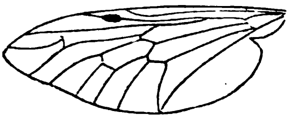
Very similar to the foregoing, but differing in several important characters. Hypostome and forehead greyish-white, with several glabrous black spots, as in the other species; palpi and antennæ testaceous; the terminal joint of the latter dusky, except at the base: thorax shining black, with three longitudinal greyish lines, the sides reddish; scutellum black: abdomen with the first segment yellow on the sides, and black round the scutellum; the second yellow, with a small triangular, or rather slightly lunate black spot on its middle; third yellow, with a transverse black fascia broadest towards the middle, but having its centre emarginate behind; the remaining segments black, with the hinder margin yellow: legs yellow, the thighs and last joints of the tarsi black. The wings do not differ much from those of *C. cæcutiens,* but the dark clouds are less opaque, particularly the apical one, and not covering so much of the wing. 4½ lines.

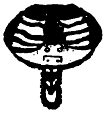
For a notice of this species, which we have now the pleasure to describe, for the first time, as a British insect, we are indebted to Charles C. Babington, Esq. who met with it in Monkswood, Hunts, June 23, 1829. The above description applies to the female only, the other sex does not appear to have hitherto been noticed by entomologists.

GENUS HÆMATOPOTA, *Meig.*

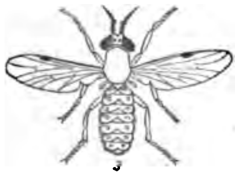
Antennæ longer than the head, radical joint rather long and pubescent, elliptical in the males, subcylindrical in the females; second joint short, cup-shaped, and pubescent; third naked, elongate and tapering, divided into four rings, the first of which is longer than all the rest taken together, (Fig. 1;) palpi two-jointed and pubescent; first joint short, second long and conical; labrum narrow and pointed, nearly as long as the labium; hypostome with an impressed cross line just beneath the antennæ, and a vertical one on each side; eyes of the male meeting above, the forehead of the female very wide, (Fig. 4;) ocelli wanting; thorax with a cross suture interrupted in the middle; abdomen somewhat conical in the male; winglets small, not covering the halteres; tibiæ in the intermediate pair of legs, with two small spines at the tip; wings lying along the body, and forming a kind of roof over it; second submarginal cell, with the rudiment of a nerve at the base; the anal cell extending to the inner edge, (Fig. 5.)

5

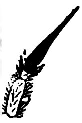




4



3



1

The port of the wings, and their speckled appearance, distinguish these insects at first sight from the rest of the Tabanidæ. Very few kinds are known, and it is even probable that some of those now regarded as species, are not entitled to such a distinction. The females are even more blood-thirsty than the rest of their tribe, and are often extremely troublesome both to men and cattle, particularly in warm showery weather, a circumstance which has caused the name *pluvialis* to be applied the most common species. The males are seldom seen, and their numbers seem to be remarkably few in proportion to those of the other sex. They appear to subsist entirely on the juices of flowers, and in conformity with their innoxious habits, the oral organs are found to be much less developed than in the female. The natural history of these insects in their early states is unknown. Fabricius states that the larvæ live in dung.

HÆMATOPOTA PLUVIALIS (s.)

Tabanus pluvialis, *Linn. Fabr. De Geer*, tab. 13, fig. 1, 2. Hæmat. pluvialis, *Meig. Latr. Fallen.*— *Reaumur*, iv. pl. 18, fig. 1. Tab. hyeomantis ♂ *Shrank.*

Female: eyes green, with transverse undulating purple-brown bands; antennæ black, the base of the terminal joint sometimes yellowish, the two lower joints not very hairy, and varying somewhat in their relative proportions:* palpi and hypostome light ash-grey, the latter with black points at the sides, and four remote black spots towards the middle, two of them deeply impreseed, and placed at the lower end of the vertical line; forehead grey, with a smooth shining-black space just over the antennæ, two velvety-black rounded spots behind it, and a smaller one in the middle; the latter sometimes obsolete: thorax blackish-brown, with greyish-white longitudinal lines, some of them having a whitish spot near the middle; sides of the breast ash-grey, hairy: abdomen dark brown, the hinder margin of the segments, a dorsal line, and a series of faint spots on each side, light grey; on each segment, beside the lateral spots, there is a short oblique line of small impressed points: under side brownish-grey; thighs grey; tibiæ black, reddish-yellow at the base in the anterior legs, and encircled with two broad rings of that colour in the others; tarsi black, the radical joint reddish-yellow at the base, except in the fore-legs: halteres yellowish-white, the knob with a brown spot: wings greyish-brown, with a dark stigmatic spot, the surface variegated with numerous whitish spots and undulating lines, many of them circular, and one of them forming a short transverse band near the apex. (*Fig.* 3.)

Male: eyes greyish-green, the lower part purplish-brown, with undulating yellowish lines: forehead consisting of a small triangular space, on which there is a callosity, and a grey dot: thorax and abdomen with similar markings to those of the female, the three first segments of the abdomen spotted at the outer side with tawny yellow.

This insect occurs in great plenty throughout Britain and Ireland. In Scotland it is called the *Cleg*, or *Gleg*, a term derived from the Danish word *klaeg*. It is by far the most troublesome of the Tabanidæ, both on account of its numbers, and its persevering and incessant attacks. The great variations in the proportions of the joints of the antennæ, have been thought to indicate distinction of species, and several have accordingly been established. But this circumstance alone is obviously insufficient, in this instance, to be assumed as a satisfactory proof of specific difference, for the variations seem to be almost without end. Thus, the *H. equorum* of

---

* The radical joint has frequently a constriction towards the apex, sometimes so strongly marked as to present the appearance of a separate articulation. It was no doubt this circumstance that deceived Reaumur, and led him to represent the antennae as 4-jointed.—See Vol. iv. pl. 18, fig. 2.

Fab. has assigned as its characters the thickness of the lower joints of the antennæ, with the addition, "nigricans, abdominis segmentis tribus anticis lateribus rufis, alis albo-punctatis;" properties which are common to nearly all the males of *H. pluvialis.* A small and dark-coloured variety has been named by Mr Curtis *H. hirsuta,* in regard to which, however, it is worthy of remark, that both sexes have occurred, a female having been taken by Mr Dale near Loch Rannoch in July 1825. *H. Italica,* figured by Mr Curtis, from its superior size, looks more distinct; it was taken at Southend, Mersey Isle, Essex, by Mr Churchill. Numerous other modifications in the appearance of this fly might be mentioned; but it is better to consider this tendency to variation as part of its specific character, than to indicate the varieties as essentially and permanently distinct. It might be worth while, however, to examine the *eyes* in living specimens, as any marked dissimilarity in the colour and markings of these organs would afford more distinctive and satisfactory characters than any hitherto detected.

(*To be continued.*)

IX.—*Contributions to the Natural History of Ireland.* By William Thompson, Esq. Vice-President of the Natural History Society of Belfast.

No. I. *Sterna stolida.—Larus Sabinii.—Cygnus Bewickii.* *

STERNA STOLIDA, *Linn.*

In March 1833, when looking over the collection of Irish birds belonging to Thomas W. Warren, Esq. of Dublin, I perceived, to my great surprise, amongst them (though passing merely under the name of Black Tern, on account of the dark hue of its plumage,) a specimen of the *Sterna stolida.* On being informed that this bird had been received as Irish from William Massey, Esq. of the Pigeon-House, and that his collection contained a second specimen, I waited on this gentleman to make inquiry respecting them. In May 1834 he informed me, that in the summer about four years since, he was favoured with the two specimens in question by the captain of a vessel, who stated that they had been shot in his presence a few days before, between the Tusker Light-House, off the coast of Wexford, and Dublin Bay. That only a few days had elapsed since these birds were killed was apparent, not only to Mr Massey himself, (who, from occasionally preserving birds for his own collection, is conversant with such subjects,) but to Mr Glennan, the bird preserver, by whom they were set up. Their having been skinned by an unskilful person, who left some of the flesh adhering to the skin without applying any preservative to it, proved their comparatively recent state to more than one sense.

---

* Part of a paper read before the Linnæan Society of London on April 15 and June 3, 1834.

The history of these birds, as just given, was related to me when I first saw them; but I did not feel myself warranted in thus bringing it forward, without having the direct testimony of Mr Massey. Both specimens are in mature plumage. This is, I believe, the first record of the occurrence of the *S. stolida* in Europe.

LARUS SABINII.

On the present occasion I have not only the high satisfaction of enriching the British Fauna, by adding to it the beautiful *Larus Sabinii*, so lately discovered, but of describing the species in the plumage of the first year, in which attire it has never come under the inspection of the ornithologist. The bird now exhibited was shot in Belfast Bay, on the 18th September 1822, by the late John Montgomery, Esq. of Locust Lodge, who carefully preserved it, under the impression that it was an individual of the closely allied species *Larus minutus*, by which name it was distinguished, when presented in April 1833 to the Natural History Society of Belfast. Mr Montgomery informed me, that from the diminutive size, &c. of this bird when first seen by him, he had no doubt of its rarity. It was so unwary as to alight once or twice within twenty yards of him; but, to avoid disfiguring it, he fired from so great a distance, that it was only at the third shot eventually obtained. That the species is regardless of the report of a gun, was witnessed by Captain Sabine in its breeding haunts, within the arctic circle, as he states, that "when one bird of a pair was killed, its mate, though frequently fired at, continued on wing close to the spot where it lay."

Although the *Larus Sabinii* closely approximates the *Larus minutus* in general appearance, the plumage of the first year, as well as that of maturity, being very similar in both species, the superior size of the *L. Sabinii*, its tail being forked to the depth of an inch, and the comparatively greater length of its tibia and tarsus, may always (even in a preserved state) afford sufficient specific distinction. In the form of the tail, the *L. Sabinii* approaches the typical species of *Sterna* more nearly than its congener, the *L. minutus*. The latter, however, resembles that genus more in the form of the bill, and in the dimensions of the tarsus and tibia.

In this specimen of the *L. Sabinii*, in the autumnal plumage of the first year, the forehead, space immediately above the eye, and between it and the bill, (with the exception of the narrow line of greyish-black closely encircling the front and lower part of the eye,) upper part of the throat, and sides of the neck are white; crown, nape, and back of the neck, blackish-grey; back, scapulars, greater and lesser wing-coverts, blackish-grey, tinged with yellowish-brown, the extremity of every feather varying from greyish-white to white, as it approaches the tail; under part of the throat and upper part of the breast, pale ash-colour; lower breast and all the under plumage, white; shafts of the first 6 primaries brownish-black at base, becoming gradually darker towards the extremity, where they are black in the first 3, but in the 4th, 5th, and 6th assimilate in colour to the feather at that part, which is white; the entire of the outer webs of the first 5 black; the inner webs, with a broad edging of white, to within from one to two inches of the end, which part is black in the first 3, but tipped with white in the 4th and 5th; in the 6th the inner web is white, the outer black, excepting for three or four lines from the tip, where it is white, and again, at about an inch from the end, where a white spot of an oval form appears.* Feathers of the tail 12 in number, white, with black tips; in the two shortest the latter colour extends upwards of an inch from the end, in the outer web especially; of the other feathers, the black prevails in a less degree as they increase in length; upper and under tail-coverts white.

Length, (total) - - -	12 inches.	0 lines.
of tail, - - .	4	9
wing from carpus to end of 1st quill,	10	0
bill from forehead to point, -	0	10
bill from rictus to point, - -	1	5
tibia bare of feathers from the tarsal joint for	0	9
tarsus, - - -	1	4
middle toe and nail, - -	1	1½
outer toe and nail, - -	1	1
inner toe and nail, - -	0	9½
hinder toe † and nail, - -	0	2
Depth of fork of tail, - - -	1	0

In the museum of the Royal Dublin Society, I lately observed, without having any label attached so it, a second specimen of *Larus Sabinii.* Upon inquiry from Mr Wall, the very obliging curator (who treasured the bird as a rarity, though he had not ascertained its species,) I learned that it had been shot by himself in Dublin Bay, near to Kingstown, a few years before, but he could not recollect at what season. The stage of plumage, however, affords sufficient evidence that it was killed in autumn, being a bird of the first year, and similar in appearance to the specimen in the Belfast Museum.

---

* This marking of the 6th primary is just the opposite of that observed by Mr Sabine in some mature specimens, in which its prevailing colour was white, "with sometimes a black spot near the end." Dr Richardson has remarked, in the Fauna Bor. Amer., that this primary is subject to variation.

† This is placed so high that the point of the nail does not reach within 1½ lines of the ground.

The occurrence of only two specimens of this Gull within the Eastern Hemisphere, has hitherto been recorded, both of which were obtained by Captain Sabine at Spitzbergen.

CYGNUS BEWICKII, *Yarr.*

In the winter of 1829–30, a specimen of the *Cygnus Bewickii*, shot, I believe, in Lough Neagh, was brought to Belfast market. It was purchased for the Natural History Society of that town, and set up for their museum, the sternum, trachea, &c. being carefully preserved. In February 1830, a flock containing seven of these swans alighted in a flooded meadow near Belfast, when they were shot at, and two of them so disabled by the one discharge, as to be after some difficulty secured. They were bought by my friend William Sinclaire, Esq.; and on their wounds being found so trivial, as merely to incapacitate them from flight, were placed in his aquatic menagerie, where, in company with many other species of wild fowl, chiefly *Anatidæ*, they have ever since remained. On March 13, 1830, another specimen of *C. Bewickii* appeared in our market, and met with a purchaser in my friend Richard Langtry, Esq., who has it preserved in his collection.

On a comparison of the first mentioned individual, with the description of *Cygnus Bewickii* by Mr Yarrell,* Mr Selby,† and Sir William Jardine,‡ I found the internal structure to agree, but in the external characters, there was one important difference, the number of tail-feathers being 20 instead of 18, as specified by these distinguished ornithologists. The result of this discrepancy induced me in February last to examine Mr Sinclaire's birds, which I did, with the assistance of that gentleman. These individuals differed from the descriptions above referred to in the following characters:—In the number of tail-feathers, which in both birds amounted to 20;[*] in the irides, those of both birds being blackish instead of orange yellow. The feathers on the forehead and region of the eyes were white, though the plumage of these parts was of a rust colour when the birds were captured. The two preserved specimens also have this rust colour about the head, but do not, like the immature birds described by Mr Yarrell, exhibit the least appearance of it on "the under surface of the belly." This part of the plumage being white, hence we may conclude, that the specimens under consideration were older than those so described by that gentleman, and that the head of the *C. Bewickii* retains the reddish plumage for a longer period than the under parts. Mr Yarrell has correctly remarked, that the plumage of the *C. Bewickii* is "ultimately pure white;" but Sir Wm. Jardine and Mr Selby have assumed that the ferruginous markings on the head are permanent, as they are thus described in their specific characters of this swan, "fronte genisque ferrugineo maculatis." In one of the living birds there is not even, up to the present time, the slightest appearance of a tubercle or knob at the base of the upper mandible. This swan seems to be a female; her neck, whether on land or water, is always borne in such a manner as to appear much shorter than that of her companion: the yellow of her bill also is of a pale lemon-colour, whilst that of the other bird is orange: there are also such other differences observable as serve to distinguish the sexes of swans and geese in a living state. In conclusion, I shall only remark, that these swans were similar in length and breadth, each being 3 feet 10 inches from the point of the beak to the extremity of the tail, and 6 feet 4 inches across the wings: that the tubercle on the bill of the assumed male has not during four years increased in size; and that this ridge of the upper mandible in the assumed female is black from base to point, a small patch of pale-yellow, irregular in outline, appearing on the sides only of that mandible, about 3 lines from the base; the yellow colour is indeed differently disposed on the bills of all the four specimens.

---

* Linnæan Transactions, Vol. xvi. p. 445. et seq.

† Illustrations of British Ornithology, letter-press to, *pro tempore*, p. 119.

‡ Jardine and Selby's Illustrations of British Ornithology, part 6.

Mr Sinclaire informs me, that every spring and autumn since he has had these swans, they have regularly, about the months of March and September, become very restless, and for the period of at least three weeks, have wandered from the enclosure within which they are contented to remain all the rest of the year. In disposition, they are timid and extremely gentle, and never attempt to molest any of the wild fowl confined in the same pond with them, though all of these are their inferiors in strength and size. Their call, chiefly uttered at the migratory periods, is a low deep-toned whistle, once repeated. On the water, the carriage of the *Cygnus Bewickii* is intermediate in its character between that of the mute swan and common goose; but if these birds exhibit not the grace and majesty of the former on this element, they appear to much more advantage on the land, where, by choice, they spend the greater portion of their time.

---

[*] In the Fauna Bor. Amer. part 2, p. 465, a specimen killed at Iglvolik is described as having 18 tail-feathers, and the irides of an orange colour.

The Museum of the Royal Dublin Society contains a specimen of the *Cygnus Bewickii* (though not so labelled) which was shot in November 1830, on the west of Ireland. It exhibits the rust-colour on the head, indicative of immaturity. In the collection of William Massey, Esq. of the Pigeon House, Dublin, I recognised another individual of this species, in the immaculate plumage of maturity. This was, along with a second specimen, killed by Mr Massey, out of a flock of five, in Dublin bay, on the 18th December 1829. The *Cygnus Bewickii* has not before been recorded as occurring in Ireland.

I subjoin the following notes, made subsequent to June 3, 1834, when the last part of this paper was read:

LARUS SABINII.

"A third specimen of this bird occurred last autumn in Ireland. It was shot on or about September 15, 1834, on the shore of Belfast Bay, near Claremont, the residence of Mr Clewlow, in whose possession it now is. It is a young bird of the year, and in plumage similar to the other two individuals of this species, which I had the satisfaction of announcing to the Linnæan Society, last year, as having been obtained in Ireland."* The dimensions of this bird, taken in the same manner, and compared with those of the individual above described, exhibit but one difference at all worthy of notice; its first quill being longer than the second, though the second slightly exceeds the first, in the latter specimen.

CYGNUS BEWICKII.

June 1834. On a fine sheet of water, in the demesne of the Marquis of Sligo, at Westport, county of Mayo, I observed a swan of this species, in mature plumage, but could not learn any particulars of its capture. January 5, 1836. William Sinclaire, Esq. informs me, that he heard of two "strings" of wild swans, consisting of twenty-eight birds, having been seen yesterday at the bog-meadows, near Belfast; and that he to-day saw a string of nineteen, flying with extreme slowness, from the direction of Belfast Bay, to the same place: from their call, though somewhat hoarser, being like that of the individuals in Mr Sinclaire's possession; and from their apparent similarity in size, he was fully satisfied that they were the *Cygnus Bewickii.*

---

* Proceedings of the Zoological Society of London for 1835, p. 83.

Dublin, February 5, 1836. In a letter to me of this date, Robert Ball, Esq. mentions having recently got three specimens of *Cygnus Bewickii;* two of which were shot in the county Fermanagh, and a third he bought in Dublin market; along with the last, there was another exposed for sale, but he could not ascertain where they were killed.

March 17, 1836. I examined a specimen of *Cygnus Bewickii,* which was shot at Lough Beg, adjoining Lough Neagh, on the 12th instant. Its length is 3 feet 9 in.; tail feathers 20; knob in bill very small; feathers on forehead deep rust colour; on sides of head tinged with pale rust-colour at their extremities; tips of feathers on breast and entire under surface of belly of a rust-colour, so extremely pale, as to have the appearance merely of being soiled; bill pale orange on the ridge, as far as nostrils: on the sides, this colour advancing a little farther, thence to tip black. On dissection, it proved a female. Its stomach was filled with minute seeds and gravel. As I have, during the last two months, heard of flocks of wild swans being frequently seen on Lough Neagh, there is little doubt that they have been there since first observed in January, and that they will most probably remain until the period of their vernal migration. The five remaining birds of the flock, out of which Mr Sinclaire's specimens were obtained in 1830, went off in the direction of Lough Neagh, and a similar number, presumed to be the same individuals, were a few days afterwards seen in the flooded meadows, where they had been fired at. This is mentioned, simply to show their continuance in the neighbourhood.

Although the *Cygnus Bewickii* is considered to visit England less commonly than the *Cygnus ferus,* it is certainly of more frequent occurrence than this species in Ireland.

X.—*Description of two new species of Opuntia; with remarks on the Structure of the Fruit of Rhipsalis.* By Rev. J. S. Henslow, M. A. Professor of Botany in the University of Cambridge.

Sp. 1. *Opuntia Darwinii,*—prostrata, articulis globoso-ovatis, aculearum validioribus elongatis tricuspdiatis, floribus magnis solitariis. Plate XIV. Fig 1.

The terminal articulation (the only one seen) globoso-ovate, with distant areolæ beset with short tomentum, and those towards the anterior extremity with four to six stiff spines of various lengths, of which the stoutest are one and a half inches long, evidently formed out of three combined, and whose points are free, so that the compound spine appears compressed and tricuspidate. They mostly point forward, but some spread in all directions. Flowers solitary, larger than the articulations which they terminate, yellow. Perianth of six whorls, each of five parts, gradually passing from the form of small fleshy bracteal scales to membranous petaloid segments; spirally arranged at somewhat more than the fifth of a circle asunder, so as to form five distinct secondary spirals, corresponding to as many, formed by the areolæ on the fleshy tube investing and surmounting the ovarium. These areolæ are placed upon slight tubercular elevations, each bearing a small fleshy bracteal scale, in whose axil is a tuft of yellow tomentum, and those on the upper extremity are also furnished with about half a dozen stiff acicular spines. The segments of the perianth pass gradually from the ovate-apiculate bracteal form of those in the outermost whorl to the cuneato-obcordate, and slightly mucronate petaloid form of those in the innermost, (Fig. *b.*)

Stamens numerous, covering the inner paries of the fleshy tube, (Fig. *c.*) Style remarkably stout, cylindrical, with nine thick radiating stigmata, reaching above the fleshy tube, and a little beyond the uppermost stamens. Ovarium, a small cell, the width of the style, surrounded by the very thick fleshy walls of the lower part of tube or floral receptacle. The character of the herbage appears to agree with that of *Cactus moniliformis*, Lin., which De Candolle places in his division Opuntiaceæ of the genus Cereus; and of which division he says, " An genus proprium inter Cereos et Opuntias medium ?" The flowers of our plant, however, are strictly those of an Opuntia. In assigning the character of " tubum suprà ovarium nullum" to Opuntia, De Candolle must consider the whole of the fleshy tubular portion of the receptacle to which the stamens are attached as part of the ovarium, which, inceed, it appears to be, when seen from the outside of the flower, but in a transverse section (Fig. *c.*) is evidently prolonged above it.

I have named this interesting Cactus after my friend C. Darwin, Esq. who has recently returned to England, after a five years absence, on board his H. M. S. Beagle, whilst she was employed in surveying the southernmost parts of South America. The specimen figured was gathered in the month of January, at Port Desire, lat. 47°. S. in Patagonia. He recollects also to have seen the same plant in flower as far south as Port St Julian in lat. 49°. S. It is a small species growing close to the ground on arid gravelly plains, at no great distance from the sea. The flowers had one day arrested his attention by the great irritability which their stamens manifested upon his inserting a piece of straw into the tube, when they immediately collapsed round the pistil, and the segments of the perianth soon after closed also. He had intended to procure fresh specimens on the following day, and returned to the ship with the one now figured, but unfortunately she sailed immediately afterwards, and he was prevented from obtaining any more. The geographical position of this species is beyond the limits hitherto assigned to any of the order, which are not recorded as growing much south of the tropic of Capricorn. The climate is remarkably dry and clear, hot in summer, but with sharp frosts during the winter nights. He found Cacti both abundant and of a large size, a little further to the north at Rio-Negro in latitude 41°. S.

Sp. 2. *Opuntia galapageia.*—articulis compressis (saltem junioribus) obovato-rotundis, aculeis setiformibus, longis, penicillatim dispositis, lanugine suprà ovarium densâ.

Plate XIV. Fig. 2.

I am also indebted to Mr Darwin for this second Cactus, of which he brought home in a dry state the specimens here figured. He found it at the Galapagos islands, where it attains to the form of a tree, averaging from six to ten feet high, and about a foot in diameter, perfectly cylindrical or very slightly tapering. The bark is pale-coloured, and in old trees hangs in a ragged manner upon the trunk, which is covered with very strong sharp spines, five to ten of which are set in each fasciculus, in a radiatory manner. From the summit of the trunk numerous branches spread on all sides, somewhat in the manner represented by Fig. *f.*, taken from a very rude sketch of Mr Darwin's. He states these branches to be composed of compressed, rounded, oval articulations, each of which is about one foot in length, wholly without the true spines found on the trunk; but with numerous scattered fasciculi of long elastic bristles strongly resembling hogs' bristles.

Flowers solitary small, like those of *O. Hernandezii*, a few together on the edges of the articulations, (Fig. *b*) red, with the lanugo in the areola on the ovarium dense, especially towards the upper parts, and with a dense tuft also surrounding its base. Outermost segments of the perianth somewhat scarious, cuneato-obcordate, with an apex, the innermost membranaceous petaloid obovate, emarginate, with a slight mucro. Stamens very numerous and crowded, covering the whole inner surface of the tube. Style cylindrical, stout, (flexuous ?) with eight stigmata, which are thick, erect, and closely appressed.

This species grows in the lower regions of James's Island, one of the Galapagos, where the soil is extremely arid and rocky, and where it is the only plant of sufficient magnitude to afford any shade, the next in size forming nearly leafless bushes. The want of water is very great, and the succulent branches of these trees are eagerly devoured by the large tortoises from which the islands have received their name, by large lizards which also abound, and by various other animals. Mr Darwin considers that they are occasionally furnished with a supply of this food from branches broken off by the wind. He found that lizards four feet in length were easily enticed, whenever he threw them a piece of a branch, and small birds would come within a few feet of him and peck at the one extremity, whilst the lizard was eating at the opposite end.

Another Cactus was observed in these islands with the habit of *Cereus peruvianus*, but which does not attain to more than two or three feet in height. It is the first plant that takes possession of the newly formed beds of lava. Not finding it in flower, Mr Darwin did not preserve a specimen.

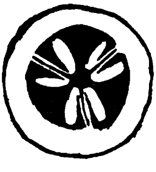
Explanation of the Figures.

Fig. I. *(a)* an articulation with a flower; *(b)* a petal; *(c)* a longitudinal section of the flower, shewing the position of the stamens, &c. All of the natural size.

Fig. II. *(a)* part of a large articulation, with a young one attached to it; *(b)* four flowers, one expanded, and three in bud, seated on the edge of an articulation; *(c)* a longitudinal section of a flower bud enlarged; *(d)* a sepal or outer segment of the perianth; *(e)* a petal or inner segment; *(f)* a rough sketch of a tree. All, except *c* and *f*, of the natural size.

On the Structure of the Fruit of Rhipsalis.

The fruit of Rhipsalis has been considered to possess a different structure from that of all other Cacteæ, in having placentæ in the axis of the berry instead of on the paries, and the berry itself has also been considered as probably trilocular, whilst those of all other genera in the order are unilocular. Hence De Candolle has placed it in a separate tribe, his Rhipsalideæ, expressing, however, some doubts about the accuracy of the observations upon which he has founded his arrangement. In his last memoir on the Cacteæ (1834,) he separates *Rhipsalis salicornioides* from the rest, under the generic name of Hariota; and in that species he states that he had ascertained the ovary to be unilocular, and the placentæ parietal. I have lately had an opportunity of examining the fruit of *Rhipsalis cassytha* in all stages of its growth, and can safely assert that both suppositions, of its being trilocular and having central placentæ, have originated in a mistake. When the fruit is ripe, the seeds are nestled in the midst of a very liquid pulp, and are no longer attached to any part; but in earlier stages of its growth, they are found to adhere in double rows upon three placentæ, disposed longitudinally on the paries. At first sight there is a deceptive appearance of three dissepiments, or at least of three inwardly projecting placentæ, to the innermost extremities of which the seeds are attached; but further examination shews this to arise, merely from the close agglomeration of the funicular chords (see Fig. A,) which stretch from the paries towards the axis, and from whose extremities the ovules are suspended in a reversed position. The placentæ themselves scarcely form any projection on the paries, as is very evident in some cases where many of the ovules have become abortive; and, indeed, several are so in all cases, and then appear as small brown spots attached to the paries. It seems to me likely that the watery pulp in which the seeds are nestled in this and other genera of the order is derived from the super-developement of the cellular tissue of the funicular chords. The whole coat of the berry, formed by the union of the calyx tube and pericarp, is very succulent, but the interior pulp is much more so; and this does not appear any way connected with, or to originate from the inner coats of the pericarp, but in the way here suggested. Be this as it may, it is sufficiently evident that the ovary and fruit of Rhipsalis are strictly unilocular with parietal placentæ, as in all other Cacteæ, and, consequently, it is necessary that the tribe Rhipsalideæ should be suppressed.



A

REVIEWS AND CRITICAL ANALYSIS.

Histoire Naturelle des Iles Canaries.—Par MM. P. Barker-Webb et Sabin Berthelot. 4to. avec Atlas in Fol. Livs. i. vii. Paris, 1836.

The Canary Isles are so frequently the first extra-European land which is visited by a traveller, either in the pursuit of commerce, or to explore the riches of nature, that we do not wonder at the delight and enthusiasm with which naturalists have landed on their shores, and enjoyed the few days which the farther progress of the voyage would allow them to devote to their examination. To such feelings we are indebted for the glowing description which M. Humboldt has given us of his six days residence there, on his way to the sterner, and more stupendous scenery of the Andes; and to such more lately, the rapture of D'Orbigny, while traversing their ravines before proceeding to the same regions. These islands have also been a favourite theatre for the experiments of many men well versed in the physical sciences, or attached to the history of the laws affecting the geographical distribution of plants. Their geography and history have received able contributions from Fuillée, George Glass, Bory de Saint Vincent, Cordier, and others; while the short visit of Humboldt, and the residences of Broussonet and Von Buche, produced a mass of information of the utmost importance, both to the above-mentioned branches and to their natural history. But the works of all these able men are scattered, and seem to have been severally conducted with no view to any general plan. The authors of the work whose title we have just quoted, on the other hand, possessed of all the knowledge which the researches of their predecessors could give, have undertaken a series of observations, which time has enabled them to complete, and of which the commencement is given in the livraisons now before us.

M. Berthelot arrived in Teneriffe towards the end of 1829, and, during a residence of ten years, explored the riches of the island, while at the same time he endeavoured to perfect the management of an acclimatory garden, which he had been requested by the Marquis Villa Nueva del Prado to superintend. This important object was frustrated by an ill-natured jealousy and the spirit of party, which, though it rendered his attempts for that purpose unavailable, permitted him more leisure, which was profitably employed in researches through the island. In 1828 he was joined by Mr Webb, and the two following years were spent in exploring Teneriffe, and the adjacent Canaries.

The plan of Webb and Berthelot's, "*Histoire Naturelle des Isles Canaries,*" is as follows:—The work will form three quarto volumes, with figures on a similar scale, accompanied by a folio atlas, containing from twenty-five to thirty plates, and the whole number of plates engraved or lithographed will be about 300. The first volume (to be sold separately,) will contain a kind of historical miscellany,—the History of the Conquest of the Canaries, Statistical tables, &c. The second volume will comprehend the Geography, Geology, and Zoology; while in the third will be given the general Flora of the Canaries, their botanical geography and phytography. Fifty livraisons will complete the work, and two numbers are published monthly.

It is with the zoology and botany that we feel most interested. The first we cannot now enter on, no part of the letter-press having yet appeared, and only one plate of the illustrations being published, a figure of *Fringilla Teydea,* W. and B. male and female; a lovely finch, and so far as we can judge from the well-executed figures, joining the finches to the Tanagers by means of the birds allied to *Tanagra episcopus.*

In the botanical portion we shall first speak of the plates of the phytographic department, or the figures of the species which have been thought worthy of illustration. (None of the descriptive letter-press has yet appeared.) These are engraved upon stone by M. Vielle of Paris, in a style of sharp boldness which could not be improved by the graver, while the details and characters are executed with decision and botanical accuracy. The colouring is slight, but sufficient and clean, and as figures they will rank with the performances of masters of the science and the art. The *Cistineæ, Cruciferæ, Frankeniaceæ, Resedaceæ, Hypericineæ, Malvaceæ,* and *Zygophylleæ,* have been already partly illustrated.

The phytostatic branch of the work, to us the most interesting as perhaps comparatively the most novel, is much more difficult, and requires a union of talent for its execution, which is not always to be found combined. We are happy, however, to think that some travellers are following the hints which were given by Martius in his "Palms," and in his interesting plate of the "interior of a Brazilian forest." D'Orbigny has commenced this plan in his great work though only one plate has yet been given; and in the publication before us we have already six views of some of the most prominent regional vegetations. There is something peculiar in the vegetation of every clime and country which stamps the landscape for its own, The deep and sombre gloom of the European pine forests, or the grander character of those of the new world. The "gray old trunks that high in heaven mingle their mossy boughs," the peculiarity of the carpet underneath, "Beauty such as blooms not in the glare of the broad sun," would form pictures strong in contrast with the rich and broad foliage of the tropics, their profuse blossoms and their gorgeous hues; and which would show even a wider change if compared with the low vegetation of the far north; clothing a view often boundless in extent with a uniformity of colouring, dark green and gloomy, or brown and sombre, and interrupted only by some pinnacle of cold grey rock, or the icy glance of some distant water. In these landscapes, however, the general characters would be at once felt and caught, and the distinction could not fail to be marked; but when the zonal plants of an island have to be characterized, the short and peculiar growth of the coast contrasted with those of higher regions, we find the artist at a loss and hampered, and the aid of the botanist required. Hence it is, that such views as we have now before us, are of most difficult execution, for while the vegetation must be the prominent feature in the landscape, it should not be such as to affect the harmony of the whole. This it never does in nature, and it is only when transferred to the canvass that the inferiority is perceived, and the difficulty of its execution ascertained.

In the phytostatic views already published, though a great deal is sacrificed, and properly so, to the botanist, there is in some of them considerable merit as pictures, and no over obtrusion of the vegetation. We like No. 1 and 3 best. The first is a view of a mountainous coast, the rocks tufted with *Euphorbia Canariensis* and *piscatoria*, *Kleinia neriifolia*, whose rather stiff appearance is relieved by the *Plocama pendula*. No. 2, Vue d'un Baranca, something in the same style of mountain and precipice, is curious, but not so much to our taste. It is a stiff landscape. But No. 3, "Vue de grand ravin du Badajos," with a little more force, would make a grand picture, while the introduction of some wild animals, or the soaring of an accipitrine bird, (if such in reality abide there,) would give expression to the solitariness. The other three are interesting, but want force as landscapes; and in No. 4, the interior of a forest, there is a want of richness as well as force, which we are certain the original would admit of; the great mass of vegetation in the centre is quite undefined. But we have another series of plates belonging to this part, and which are useful; they are termed "*Facies,*" and represent small groups of plants on a considerable scale, illustrating their natural characters when growing together. These two series of views in combination give all that is desired, and we would only recommend to the artist to use a little more decision.

Of the letter-press belonging to the botanical portion of this work, two chapters have been published, of which the first, devoted to the general vegetation of the Canary isles, "*Aspect général de la vegetation dans les Iles Canaries,*" has been already well translated in Dr Hooker's Botanical Miscellany, and will be found worthy of perusal where the original cannot be procured. We transcribe the opening paragraph, which will both exhibit a specimen of the style of the authors and explain some of the views which are entertained of the botany of the group.

"Les Iles Canaries, par leur proximité des tropiques, se tiennent situées sous une des latitudes les plus favorable à la végétation; leur climat se ressent à la fois de l'énergie de la zone torride, et de la fraîcheur de la zone tempérée. La chaleur du soleil s'est combinée avec le principes le plus actifs pour féconder cette terre que les volcans semblaient avoir frappée de sterilité placées dans d'autres conditions d'existence, de nouveaux germes se sont développés; se sol vierge s'est couvert des produits d'une flore spéciale, et plus tard les influences climatériques sont venues se prêter à la naturalisation des planies des deux hemisphères. Les espéces aborigénes qui apparerent spontanément dans ces îles Atlantiques, appartiennent la plupart à des genres d'Europe, mais elles sont plus vivaces, plus ligneuses, et souvent arborescentes. Il en est aussi d'autres qui ont d'autres formes et un autre aspect; plusieurs sont des monotypes de genres qui n'ont pas encore d'analogues, tandis que d'autres constituent des groupes d'espèces endémiques d'un *facies* remarquable. Parmi ces végétaux divers, ceux-ci sont empreints d'un caractère, Africain, et ceux là, quoique'n plus petit nombre, laissent déjà entrevoir quelques traits de la végétation d'Amerique. Ainsi la flore Canarienne parait établir le passage des plantes des nos pays tempérés ă celles des contrées intertropicales. Si l'on a égard à la quantité des espèces locales, à la nouveauté de leurs formes à l'etrangeté de leur port, caractères d'autant plus frappans qu'ils appartiennent à la masse des plantes dominantes, l'archipel des Canaries mèrite bien le titre de *Région botanique*."

In very many instances do these islands present most interesting subjects for the researches of the botanist and vegetable physiologist. The mixture of species from a temperate clime with those of the tropics, as mentioned in our quotation, is important, but every island in the group presents something curious in the general aspect of its vegetation; each may be said to possess a miniature Flora of its own; and there are in all, species, which are either peculiar, or are remarkable for their abundance in only one or two stations; while the more that an advance is made towards the centre of the Archipelago, the richer does the Florà become in Canarian species.

The western group of these islands differs very markedly from the eastern, and possesses some species quite exclusively. A new species of a Cape genus, *Manulea Canariensis*, W. and B., is established in the ancient crater of Bandama, and *Commelina Canariensis* is only found on the banks of the rivulets around Cuidad and Terror. At Palma, the *Umbilicus Heylandii*, W. and B., is found only in the pine woods of Barlavento. The *Sempervivum Goochiæ*, W. and B., grows only in the ravines of the eastern coast, while the *Bethencourtia Palmencis* is almost concealed in the immense depths of the Caldera. The existence of these plants, and of many others in solitary stations, seems quite inexplicable, and appears to be much influenced by local circumstances of soil and atmosphere. "Les lois de la repartition des germes sur la surface du globe, peuvent seul donner l'explication de ces bizarres anomalies: Mais ces lois se lient, aux causes premieres par lesquelles la nature agit secretement; ce sont de principes qu'elle ne nous a pas révéles, et de long-temps, peut-etre, nous ne pourrons pas plus pénétrer le mystere de ces creations spontanées que celui de leur stabilite ou de leur migration."

The littoral aspect of Teneriffe, as well as that of Canaria, Palma, Gomera, and the "isle de Fer," present as it were a bulwark of cliffs. The plants in these districts take root in the chinks, clothing the slopes and flats that surmount them. They are for the most part species with fleshy leaves, which imbibe the vapours of the atmosphere, or the exhalations from the sea-breeze. They belong to the *Ficoideæ, Chenopodeæ, Euphorbiæ, Crassulaceæ*, &c., and though these sometimes overrun the slopes of the valleys, and the sides of the ravines, they cannot exist far from the influence of the sea. On a little higher range we have another tribe of succulent plants, *Sempervivæ*, but which are not so dependent on the same circumstances of exposure. They are a numerous class, and grow on old walls or mural precipices, where the moisture, though abundant, does not lodge or remain long at a time. Rising above these cliffs the country stretches into plains, which again rise towards the centre of the island, and are rent into valleys and ravines. Here the vegetation is characterized by naked trunks, and pale glaucous foliage, and assumes an African character; *Euphorbia Canariensis* prevails, mixed with *Kleiniæ* and *Plocamæ.* But in the valleys intersecting this maritime expanse, a much more anomalous mixture is presented, for the introduced species, the date, papaw trees, orange, peach, and banana, mingle with the *Dracæna, Bosea,* and *Ardisia.* The ravines in these islands also affect a peculiar character; they are commonly like large fissures radiating from the centre, with precipitous basaltic walls on each side, often 800 feet in height, and sometimes so near and narrow, that the plants on either side weave a canopy above. At their entrance, the vegetation of the coast is prevalent, but it changes with rich luxuriance, and ultimately assimilates with the character of the woods, and exhibits scenes of grand and picturesque beauty. Thus they lead to the region of the forest, where the laurels prevail over all the other woody plants, and where the four Canarian species, *L. Canariensis, Indica, barbusana* and *Persea fœtens,* mingle with the heaths, *Visneæ, Ilex,* and *Arbutus.* Next rise the wasted plains where vegetation, at first luxuriant, becomes gradually more thin and scattered, and at last is restricted to bushes of *Cytisus* and *Pteris,* which spread in masses to the boundaries of the pine woods. The Canary pine, in general form and appearance, resembles the species of Europe, and this region calls to mind the appearance of our alpine forests. It grows on the steep slopes, and more elevated descents of the mountains, but seldom surmounts the crests of the ridges. Underneath these gigantic trees, the soil is dry and light, and the number of nemoral plants is comparatively limited. Ascending still higher, the pinnacles which surround the peak, when seen at a distance, appear bleak and barren, but even here there are several plants which cannot be elsewhere gathered, such as *Carlina xeranthemoides, Cheiranthus scoparius,* or the *Plantago Teydea*; a single shrub *Rhamnus coriaceus* grows only on the summit of Guaxana; the *Juniperus cedrus* crowns the cone of Cedro, while the Rose of Armida, and a variety of *Pyrus aria* inhabit exclusively two spots considerably apart from each other, the mountain of Rosal, and the Tiro del Guanche of the Cānadas,—and above this elevation, when the traveller reaches the peak itself, the ' Teyda," the vegetation of these wild regions is found to be altogether original. *Cytisus proliferus* is the first shrub which is seen on entering the gorge of the Cānadas, then *Adenocarpus frankenioides* and *Cytisus nubigenus*; lastly, *Silene nocteolens,* and *Viola cheiranthifolia,* appear on the peak itself, among masses of pumice, the last of the flowering plants. Lichens and a few minute mosses mark a farther but now nearly exhausted state of vegetation; and at 11,424 feet *Weissia verticillata* springs in the crevices, heated by the constantly exhaling vapours. Such is a very rapid sketch of the manner in which the plants rise from the coast to the nearly barren summits.

In the second chapter, the "Distribution Phytoetatique," the distribution of the plants, taken according to the mass of species which prevail in certain ranges, from the shore to the summits of the peaks, with the relation between the vegetation and the climates, have served MM. Webb and Berthelot for the basis of their tables. These differ considerably from those of their predecessors in research: Humboldt selecting Teneriffe as possessing the greatest range of elevation, and placing a height of 10,500 feet as the limit of vegetation, divided their altitude into five zones, viz. the zone of *Vines;* of *Laurels;* of *Pines;* of the *Retamas;* and of the *Gramineæ.* Our authors, in dissenting from this division, observe, that the first zone is inaccurately defined, for the vineyards occupy but a small space in the whole, and do not reach to the sea, while they cease before attaining the elevation marked for the commencement of the second region. The *Quercus Canariensis,* (*Brouss.*) which is noted as indicating the zone of Laurels, is thought to be only the *Q. pubescens,* introduced by the first settlers after the conquest of Teneriffe, and now in a state modified by climate. The *Juniperus cedro,* (*Brouss.*) which is placed in the third zone among the pines, according to the researches of our authors, ought to occupy a much higher station. The zones of the *Retamas* and *Gramineæ,* placed at an elevation analogous to the highest ridges of the Pyrenees, should only include the last; two species of grasses only presenting themselves on the highest range; but our naturalists, at the same time, are unwilling to admit any zone of grasses at all, considering that M. Humboldt must have been deceived by false accounts, and stating, that none of the Cerealia are now cultivated beyond a height of 4,800.

The distribution of Von Buch is also differed from; here the same island is divided into five zones, characterized by elevation and temperature.

1. La region subtropicale ou des formes Africains, .	1.200. cl.	Egypt and Barbary.
2. La region Mediterranienne, ou des cultures Europeans,	2.580. cl.	France and Cent. Italy.
3. La region tonjours verte, ou celle des forets, . .	4.100. cl.	Lyons and Lombardy.
4. La region du pinar, ou des pins des Canaries, . ,	5.900. cl.	France, Scotland, N. of Germany.

5. La region des cumbre, ou celle
des Retamas blancas, . 10.380. cl. N. Scotland, Drontheim.

The first zone is considered to be too restricted, and that it should have extended at least 400 feet higher. The second is not sufficiently defined, from the variable circumstances which influence the distribution of the Cerealia and cultivated plants. The third zone, or that of the forests, is liable to the same objection, a want of sufficient definition; while the indications of the temperature, and the comparison of it with the climates of Europe, do not give an exact idea of the state of the atmosphere in each region, because there is no proportion of time between the seasons of heat and those of cold. The olive, indigenous to the Canaries, and growing at an elevation of 2,109 feet, has never been naturalized in the basin of the Po, a fact at variance with the stated resemblance of this zone to the climate of Lyons and Lombardy. Neither can the clime of the fourth region be compared with that of Germany or Scotland. In those countries *Pinus Canariensis* can never be kept alive out of the greenhouse.

In fixing their own divisions of the vegetation of Teneriffe, MM. Webb and Berthelot have taken almost every local circumstance into consideration. From numerous observations on the temperature, made at different heights, and kept simultaneously in various stations, the following results have appeared. To the height of 1,500 the temperature continues very equal, varying only from one to two degrees, according to the direction of the openings of the valleys, or as it may be influenced by the exposure, nature of the soil, or proximity to wooded hills. According to the same local circumstances, its variation above a height of 1,500 to about 4,000 is from two to eight degrees; but in this region clouds and vapours almost constantly rest on the hills and slopes, and afford a supply of moisture most favourable for vegetation, and the plants are thus found here, growing luxuriantly, and distributed in large masses. From 4,000 to the summit of the peak there is not the same moisture furnished by vapour, while the temperature diminishes proportionally to the ascent, and taking a line along the slope of 8,000, a difference is perceived of from nine to seventeen or eighteen degrees below the temperature of the coast. Upon these deductions, and allowing for variation from locality and the state of the atmosphere, our authors have divided Teneriffe into three great climates, and have given three tables, which, while they completely explain their views, are otherwise so extremely interesting, that we are induced to copy them.

PREMIER CLIMAT.

(INFERIEUR.)

EXPOSITION DU NORD.

Limites. Depuis le niveau de la mer jusqu'à 1,500 pieds au-dessus.

TEMPERATURE CHAUDE,

Maximum de la chaleur sur la côte, au niveau de la mer. . . . 30°
Minimum. . Id. . Id. 16,1
Différence de température avec celle du niveau de la mer, suivant l'altitude des stations de . . . . 1 à 2°

Etat de l'atmosphère. Brises régulières variant du N.-N.-O. à l'E-N.-E.
Ciel presque toujours sans nuages.
Quelques averses de novembre en janvier.

Terrains. Tufs volcaniques, basaltes, scories et nappes de lave en décomposition.

1re *classe.* Grèves bordées de falaises; coteaux maritimes coupés par des ravins.

2me *classe.* Ravins profonds souvent parcourus par des torrens; berges escarpées.

VEGETATION.

REGION DES EUPHORBES DANS LES TERRAINS DE LA PREMIERE CLASSE.

PLANTES DOMINANTES: *Euphorbia Canariensis*, *E. piscatoria*, *Kleinia neriifolia*, *Plocama pendula*.

ESPECES EPARSES qui appartiennent aux genres *Conyza*, *Aizoon*, *Statice*, *Artemisia*, *Prenanthes*; *Achyranthes*, *Chrysanthemum*, *Astydamia*, *Kochia*, *Periploca*, *Frankenia*, *Crithmum*, *Forskalea*, etc.

VEGETAUX NATURALISES. Palmiers, Nopals, Figuiers, Agaves, Bananiers, Mariers, Orangers, etc.

REGION DES PLANTES RUPESTRES DANS LES TERRAINS DE LA DEUXIEME CLASSE.

ESPECES EPARSES appartenant aux genres *Hypericum*, *Bystropogon*, *Echium*, *Lavandula*, *Digitalis*, *Sonchus*, *Messerschmidia*, *Thymus*, *Tanacetum*, *Teucrium*, *Sempervivum*, *Stachys*, *Salix*, *Sisymbrium*, *Solanum*, *Pyrethrum*, *Datura*, *Cineraria*, *Anthemis*, *Asparagus*, *Athamantha*, *Canarina*, *Globularia*, *Rumex*, *Bosea*, *Peucedanum*, *Phyllis Crambe*, *Camyglanthus*, *Carlowizia*, *Bryonia*, *Cyperus*, *Dactylis*, *Drusa*, *Lavatera*, *Adianthum*, etc.

EXPOSITION DU SUD-EST.

ET DU SUD-OUEST.

Limites. Depuis le niveau de la mer jusqu'à 2,500 pieds au-dessus, et même plus plus haut dans certaines localités. (Exemp. vallée de San-Iago.)

TEMPERATURE TRES CHAUDE.

Maximum de la chaleur sur la côte, au niveau de la mer. . . 33°,3
Minimum. . Id. . Id. 18,8
Différence de température avec celle du niveau de la mer, suivant l'altitude des stations de. . . . 1 à 2°,5

Etat de l'atmosphère. Calme, parfois interrompu par des vents d'Ouest ou de Sud-Est.
Ciel presque toujours sans nuage.
Pluies fort rares, même en hiver.

Terrains. Nappes de lave, tufs volcaniques, basaltes, scories et ponces en décomposition.

1re *classe.* Grèves, plages sablonneuses, falaises et coteaux maritimes coupés par des ravins.

2me *classe.* Ravins nombreux et très-profonds, rarement parcourus par les torrens, berges escarpées.

VEGETATION.

REGION DES EUPHORBES DANS LES TERRAINS DE LA PREMIERE CLASSE.

PLANTES DOMINANTES. *Euphorbia balsamifera*, *E. Canariensis*, *E. aphylla*, *Cneorum pulverulentum*, *Zygophyllum Fontanesii*, *Prenanthes spinosa*.

ESPECES EPARSES appartenant aux genres *Ceropegia*, *Gnaphalium*, *Heliotropium*, *Salvia*, *Linaria*, *Lotus*, *Lycium*, *Mesembryanthemum*, *Reseda*, *Aloe*, *Artemisia*, *Notoceras*, *Paronychia*, *Physalis*, *Jasminum*, *Saccharum*, *Sempervivum*, *Sida*, *Gymnocarpus*, etc.

VEGETAUX NATURALISES. Nopals, Agave, Figuiers, Amandiers, etc.

REGION DES PLANTES RUPESTRES DANS LES TERRAINS DE LA DEUXIEME CLASSE.

ESPECES EPARSES appartenant aux genres *Cheiranthus*, *Euphorbia*, *Salvia*, *Lotus*, *Dracœna*, *Helianthemum*, *Hypericum*, *Bystropogon*, *Echium*, *Juniperus*, *Lavatera*, *Lavandula*, *Convolvulus*, *Asparagus*, *Pyrethrum*, *Rhamnus*, *Rubia*, *Sideritis*, *Sonchus*, *Cineraria*, *Conyza*, *Salix*, *Bosea*, *Forskalea*, *Justicia*, *Bupleurum*, *Cyathea*, *Roccella*.

SECOND CLIMAT.

(INTERMEDIAIRE.)

EXPOSITION DU NORD.

Limites. Depuis 1,500 pieds d'altitude jusqu'à plus de 5,000 pieds.

Température humide.

Différence de la température avec celle de la côte, suivant l'altitude des stations, de 2 à 8°.

Etat de l'atmosphère. Brises fraîches variant du N.-N.-O. à l'E. N. E. Ciel presque toujours couvert de nuages, surtout pendant le jour. Brumes et bruines fréquentes en été. Orages et fortes pluies en hiver.

Observation. La neige, qui, dans la saison hivernale arrive parfois jusqu'à la limite supérieure de ce climat, s'y fond presque aussitôt.

Terrains. Vallées et montagnes; sol argilo-volcanique chargé d'humus. Laves décomposées.

VEGETATION.

REGION DES LAURIERS ET DES PLANTES NEMORALES.

ESPECES DOMINANTES. *Laurus Canariensis, L. Indica, L. Barbusano, Persea fœtens, Myrica Faya*, et autres espèces éparses appartenant aux genres *Arbutus, Ardisia, Bœhmeria, Cerasus, Celastrus, Erica, Ilex, Myrsine, Olea, Pittosporum, Rhamnus, Viburnum, Visnea.*

ARBRES NATURALISES. *Castanea vesca, Quercus pubescens.*

PLANTES NEMORALES des genres *Adenocarpus, Cineraria, Convolvulus, Dracocephalum, Exacum, Fragaria, Genista, Festuca, Geranium, Hedera, Luzula, Myosotis, Origanum, Ranunculus, Rubus, Ruscus, Scrophularia, Sempervivum, Smilax, Solanum, Viola*, etc.

FOUGERES. Diverses espèces des genres *Adiantum, Asplenium, Blechnum, Cyathœa, Davallia, Gymnogramme, Trichomanes, Woodwardia*, etc.

MOUSSES et LICHENS.

REGION DES BRUYERES ET DES CISTES.

Erica arborea, E. scoparia, Cistus vaginatus, C. candidissimus, C. Monspeliensis, Helianthemum guttatum.

FOUGERES. *Pteris Aquilina, Nothochlæna Marantæ* et N. *vellea.*

EXPOSITION DU SUD-EST

ET DU SUD OUEST.

Limites. Depuis 2,500 pieds jusqu'à environ 4,000 et quelquefois moins, suivant les localités.

Température. Chaude et sèche.

Différence de température avec celle de la côte, suivant l'altitude des stations de 3 à 6°.

Etat de l'atmosphère. Calme, parfois interrompu par des vents de S.-E. très-chauds. Ciel presque toujours sans nuage; seulement quelques brouillards dans les vallées boisées.

Pluies rares, orages instantanés en hiver.

Observation. La neige descend rarement jusqu'à la limite supérieure de ce climat et s'y fond assuitôt.

Terrains. Vallées et montagnes presque généralement dépourvues de forêts laurifères, sol la moins substantiel, pentes plus rapides.

VEGETATION.

Seulement quelques petits groupes de Lauriers, d'Arbousiers et de Bruyères dans les gorges les plus anfractueuses du Sud-Est et du Sud Ouest.

Les Cistes en plus grande masse.

Observation. De ce côté les Cistes sont rarement accompagnés par les bruyères; ils occupent, le long de la bande méridionale de l'île, un espace beaucoup plus large que sur l'autre versant et s'étendent depuis l'altitude de 1,800 pieds jusque sur la lisière des bois de Pins (4,000 pieds). Les principales espèces de la région des Cistes sont le *C. vaginatus*, le *C. Candidissimus*, le *C. Monspeliensis* et l'*Helianthemum guttatum.* Le *Cistus vaginatus* est toujours l'espèce dominante, le *C. candidissimus* est fort rare; on rencontre ordinairement le *C. Monspeliensis* dans les stations plus rapprochées de la côte. Quant à l' *Helianthemum guttatum*, il croit un peu partout, même dans la région des Pins.

TROISIEME CLIMAT.

(SUPERIEUR.)

Observation préalable. La distribution phytostatique n'est plus modifiée ici par l'exposition ; les nuages restent ordinairement stationnaires au-dessous de la zone dans laquelle le troisième climat se trouve compris, et les brises de mer exercent peu d'influence à cette hauteur.

Limites. Depuis { 4,000 pieds du coté du Sud / 5,000 pieds du coté du Nord } jusqu'à la cime du Pic (11,424 pieds.)

Température. Assez chaude et sèche pendant le jour, froide et parfois humide pendant la nuit. Différence de température avec celle de la côte, suivant l'altitude des stations, de 9 à 18°.

Etat de l'atmosphère. Vent faible et chaud pendant le jour sur tous les plateaux supérieurs et les crètes des montagnes ; calme pendant la nuit, mais cet état de quiétude est souvent troublé, au moment du lever du soleil, par les bourrasques subites et passagères qui se manifestent au sommet du Pic (1.)

Ciel sans nuage, air très-raréfié, soleil brûlant, nuits froides, pluies très-rares en été, orages instantanés en hiver.

Observations. La neige s'amoncelle sur les hautes cimes de l'île de Palma, dans le cirque des canadas, à Téneriffe, et sur les crètes des alentours ; mais le plus souvent elle s'y fond de suite ou disparait balayée par les vents. Elle n'est permanente que sur le pic de Teyde pendant deux mois environ ; plusieurs hivers se passent même sans qu'elle y reste plus de deux ou trois semaines. La glace se maintient tout el'année dans la grotte de la *Nieve* à 9,312 pieds d'élévation au-dessus du nivea de la mer. Il gèle quelquefois dans la nuit vers la fin de décembre et dans le mois de janvier, sur les rochers isolés et à l'ombre mais ces sortes de cas sont rares et ne se manifestent presque jamais au-dessous de 7,000 pieds.

Terrains. Talus très-rapides, plateaux et sommets culminans, mornes escarpés et pics volcaniques. Sol presque entièrement envahi par les éruptions, roches trachytiques par grandes masses, tuffs, scories et torrens de lave de différente nature.

VEGETATION.

REGION DES PINS.

ESPECE UNIQUE. *Pinus Canariensis.*

PLANTES NEMORALES. *Helianthemum guttatum, Lotus angustissimus, Festuca Myurus, Erigeron viscosum, Thymus Calamintha, Asphodelus ramosus, Pteris Aquilina,* etc. (A Palma, *Umbilicus Heylandii* N.).

REGION DES LEGUMINEUSES FRUTESCENTES ET DES PLANTES ALPINES.

ESPECES DOMINANTES. *Cytisus nubigenus, Adenocarpus frankenioïdes* (et *Cytisus proliferus* dans des stations inférieures).

PLANTES ALPINES. Eparses à Tenériffe parmi les léguminenses du grand plateau ou cirque des Canadas. *Centaurea cynaroïdes, Chrysanthemum Broussonetii, Echium Auberianum,* N., *Nepeta Teydea,* N., *Polycarpæ aristata, Scrophularia glabrata, Pteris Aquilina,* etc.

ID. sur la crète des montagnes centrales à Tenériffe. *Arabis albida, Carlina xeranthemoïdes, Cheiranthus scoparius, Juniperus Cedrus, Ephedra monostachya, Festuca laxa, Pimpinella Cumbræ, P. Dendroselinum,* N., *Pyrus Aria, var, Rhamnus coriaceus, Rosa Armidæ,* N., *Satureja tenuis, Bethencourtia Palmensis, Tolpis lagopoda, Thymus Benthami,* N., etc.

ID. à Canaria, *Satureja lanata, S. tenuis, Genista microphylla,* etc.

ID. à Palma. *Juniperus Cedrus, Arabis albida, Cerastium strictum, var, Viola Palmensis,* etc.

Sur les pentes du Pic de Ténériffe. *Silene nocteolens,* N. et *Viola cheiranthifolia,* depuis l'altitude de 7,500 pieds jusqu'à 9,850.

A la cime du Pic, sur les bords du cratère (11,424 pieds). *Weissia verticillata, var,* et *Scytonema myocrhus.*

---

[*] Ce vent, qui oblige souvent les voyageurs d'abandonner cette station, souffle presque toujours dans une direction contraire au vent de mer.

In these "climates" our learned authors remark, "Nous n'avons valu présenter que la repartition des plantes sous le rapport des espèces qú'on rencontre par grandes masses en suivant une même ligne de pente; le régions que nous indiquons ne sont point des zones de végétaux toujours régulièrement superposées les unes aux autres. mais seulement de groupes partiels et isoles."

And those tables of the geographical distribution of plants, dividing them into defined limits, are considered as much too restricted, and so lose their greatest value, unless the effects of local circumstances, exposure, &c. come to be taken into the account. In fact, that altitude and temperature are not the only circumstances which have to be considered, or that the sort of established rule, "that every 100 feet of height would lower the temperature 1° Reaum., and was equal to 1° of distance from the pole," would depend in many, if not in most instances, upon modifications entirely local. In illustration of this, we may quote a paragraph which soon follows the remarks on zonal vegetation. "Lorsqu' apres avoir parcouru les vertes forets qui couvre une partie des versons du nord de Teneriffe, on tourne l'isle par la pointe la plus occidentale, les bois des lauriers ne se retrouvent plus que dans le fond des etroites vallées comprises entre le Cap de Zeno et le port de San-Jago. Quelque groupes d'arbres forestiers garnissent encore, de ce côté, les anfractuosités les plus humides; tandis que partout ailleurs ce ne sont que pentes arides et nues. A mesure qu'on s'avouer sur le revers meridional, le pays est encore plus dévasté: la, plus de brises rafraichissantes, plus de nuages; mais le climat de la Mauritanie meridionale avec la secheresse desesperante et son atmosphere de feu."

But amidst the varied vegetation of these islands, there are some plants which defy a rule of confined distribution, "plantes vagabondes," as they are graphically termed, which seem to delight in no peculiar zone, and to belong to every climate. Among these stragglers in Teneriffe, *Pteris aquilina, Hypericum grandiflorum,* and *Erigeron viscosum,* are widely scattered; the two first appear at from 1000 to 1500 feet of elevation, and are met with as high as 7000 feet. Some plants which grow at a low elevation, are not found for a long space, but appear again suddenly at some height, thus *Pancratium Canariense,* growing on the shore of the Val-de Guerra, appears again on the plateau of Trebejo, after an interval of 3800 feet.

Among the plants introduced to the Canaries, our authors are unwilling to include the *Dracæna draco.* This plant, supposed to be a native originally of the East Indies, is found in the Archipelago of the Canaries, as well as at Madeira and Porto Santo. It abounds on the volcanic slopes of the Brēna, in the island of Palma; at Teneriffe, some aged specimens are found in the valley of Oratava, and in the Ravin de l'Enfer; adorning the basaltic pinnacles of the eastern slopes.

Pistachus lentiscus, and *Olea Europea* are profusely distributed over the great Canary, but in Teneriffe and Palma, they have given way to the culture of the vine, though the names, still existing in the hills and valleys, shew that they were once abundant.

There are many other remarks and observations which might be taken from this department, but in noticing them all, we should have in reality to transcribe the chapter. We unhesitatingly recommend the work for perusal to botanists; they will find much information and much useful criticism upon the histories of Humboldt and Von Buch, &c., which have the additional merit of being candidly and modestly expressed, do full justice to the labours of these distinguished individuals, and we feel convinced will be read by them with pleasure, and without any of that feeling of asperity which the remarks of one traveller upon the works of his predecessors so frequently calls forth.

BIBLIOGRAPHICAL NOTICES.

Hymenopterorum Ichneumonibus affinium monographiæ, Genera Europæa et Species illustrantes. Scripsit C. G. NEES AB ESENBECK. 2 vols. 8vo.

This work, though one of importance, is known to be merely an extract from a much more voluminous one, still in MS., consisting of ten volumes in quarto. It is preserved in the museum of Bonn, to which the author was formerly attached, prior to his settlement at Breslaw. He had there formed a collection of 25,000 insects, among which are contained all the Hymenoptera described in the work above named. M. Nees d'Esenbeck is a noted botanist, and successfully combines the study of two departments of natural history, the practical pursuit of each of which so well accords with the other. This work may be regarded as a supplement to or rather a completion of M. Gravenhorst's *Ichneumonologia Europæa*, published in three very thick volumes in 1829. These authors worked with a mutual understanding of each others labours, and while the latter undertook and completed the *Ichneumones*, properly so called, the former, with equal skill and assiduity, has illustrated the *Ichneumones adsciti.*

Forstinseckten, &c. *Forest Insects. The Natural History of Insects which prove injurious to Woods*. By Professor E. A. ROSSMÆSSLER. 1 Vol. 8vo. (100 pages) with a lithographic plate. Leipsig, 1834.

This compendious work is one of the few which treats the subject to which it is devoted in a *systematic* manner. It consists of 25 paragraphs, containing observations on the generalities, the classification, the retreats, the nourishment, and the mode of distinguishing insects injurious to trees; likewise descriptions of the species in their different states, and a detailed account of the injuries they occasion. The author confines his remarks to the species which attack forest trees, in strict consistence with the title of his work, although it would have added both to the interest and importance of his labours, had he extended them to the fruit department. He arranges his insect species (only twenty in number) in reference to the trees which they attack:—as follows.

A. CONIFERÆ.

I. *Pinus abies.*

a. The young plants: Curculio abietis.

b. The old trees: Bostrichus typographicus; Hylesinus piniperda; Bostrichus chalcographus; Rhagium inquisitor (less hurtful than the others); Sirex gigas.

II. *Pinus silvestris.* L.

a. The young plants: Tortrix turiona; Tortrix Buoliana; Curculio abietis.

b. The old trees. Bombyx pini; Bombyx monacha; Geometra piniaria; Noctua piniperda; Tenthredo pini; Bostrichus pinastri.

III. *Pinus picea.* L. Bostrichus abietiperda.

IV. *Pinus larix.* L. Bostrichus laricis.

B. LEAFY TREES.

Melolontha vulgaris and solstitialis; Bombyx processionea; Bombyx salicis.

TRANSACTIONS AND PERIODICALS.—*British.*

Transactions of the Zoological Society of London. Vol. ii. Part i. Longman and Co. London. Printed for the Society. 4to. 1836.

WITH this part a second volume of these beautiful Transactions has been commenced; a publication unrivalled in the masterly execution and accuracy of its illustrations, and doing much honour to the important society by which it is published and patronised.

I. *On the quails and Hemipodii of India.* By Lieut. Col. W. H. SYKES. In the introductory part of the paper, remarks are made on the value of characters, specific and generic, a subject which has long been fruitful, and does now furnish more than the usual material for criticism. We may observe at once, that we dislike *sections* in a genus; if they are very marked, they deserve a more decided separation, if not, they do not require to be sectioned; and it must always be recollected, that if the typical form of a genus is properly selected, in other words, if the genus really deserves that rank, these variations will always mark its correctness, and some species will always be seen with characters called aberrant, uniting them with the genera which stand on either side.

We fully coincide with Colonel Sykes when he says, " I have long thought, and daily experience tends to confirm my opinion, that the researches of present and future naturalists, will deprive discoverers of many of their honours in establishing new species of birds;" at the same time what can they do so long as no authentic system exists.

Colonel Sykes considers that the quails and partridges should be united, that the former are in reality only " dwarf partridges." The characters of *Coturnix* are remodelled, but the structure of the wing is omitted in the generic character, while three sections are formed, two of which depend on " *alis acuminatis*," and " *alis rotundatis*." *Perdix* and *Francolinus* are also considered hardly sufficiently separated, and *H. Ponticerianus* is instanced, but this is just one of the specimens which will stand almost on the confines of either, and will point out their alliance.

Five species of Indian quails are described, three of which are named as new. They are beautifully represented by lithographs from the pencil of Mrs Gould. *C. dactylisonanis*, specimens from India, are considered identical with the bird of Europe, and with those from the Cape, and we agree in the wide distribution given to the species; we know that it stretches nearly over the whole of the old world. *C. textilis* is abundant in Bengal, Madras, and the Dukhun; and it is remarked here, that " so abundant are the different species of quails in the Dukhun, that in April 1829, 517 brace were killed in nine days by four guns." *C. erythrorhyncha*, N. S. met with only in the valley of Karleh in the Ghats, frequenting the same ground with the *Perdix picta*.—*C. argoondah*, rock-quail of the Dukhun, N. S., found in the level country amidst rocks and low bushes, rising in coveys of from ten to twenty or more. There is a bird from the Himalaya closely resembling some of the varieties which Colonel Sykes notices, being without the black markings, and nearly similar in plumage to the female, having the strong bill and slightly graduated quill feathers. The white streak above the eye, however, extends through it to the bill.—*C. pentah*, mountain quail, N. S., met with only on the mountains, seems a very variable species, and specimens from Himalaya, exhibit considerable distinctive marks. We here remark that we dislike the specific names which have been given to the two last, as well as to a *Hemipodius*, (H. Taigoor);

we allow the difficulty of finding appropriate names, but these have nothing to recommend them. Three Hemipodii are noticed, *H. pugnax, Dussumerii*, and *H. Taigoor*, N. S., differing from *H. pugnax* in its more slender bill and white chin and throat.——II. *Descriptions of a few invertebrated animals obtained at the Isle of France.* By ROBERT TEMPLETON, Esq.—Four animals are described, illustrated by a well-finished plate.——III. *On a remarkable species of Pteropine bat.* By E. T. BENNET, Esq.—On several of the bats there seems to be cavities and pouches connected with a glandular apparatus; and in the one now described, there is a patch of long white hairs on each side of the neck, which Mr Bennet suspects is connected with some similar arrangement. This patch is about one inch in diameter; the hairs are longer than those on the rest of the body, and they spring in tufts from a common centre, diverging to either side. In one or two other species, tufts somewhat similar have been observed, but in the present animal the greatest developement of it appears; while in most of them we also have a modification of the form, and a difference in the number of the grinders, which may ultimately be made the basis of characters for a separate genus. This animal has been named *Pteropus Whiteii*, and two plates are devoted to it, one to a figure of the bat itself, another to the appearance of the fur, taken from different parts of the body, greatly magnified.——IV. *Some account of the Crustacea of the Coasts of South America, with descriptions of New Genera and species, founded principally on the Collections obtained by Mr Cuming and Mr Miller.* By THOMAS BELL, Esq.—A valuable paper, continued from page 335 of Vol. I. but too long to be slightly noticed here. The first paper was devoted to the illustration of the genus Cancer brought home by the above named collectors, and three new species are figured and described, The present communication is devoted to the *Oxyrhynchi*. They are illustrated by five plates, containing representations of twenty-two species.——V. *Some Observations on the Economy of an Insect destructive to Turnips.* By WILLIAM YARRELL, Esq.—Observations on the *Athalia centifoliæ*, which has, during the last year, committed so much damage to the turnip crops both in England and Scotland. We regret, however, that the range of this pest has not been more decidedly pointed out. We do not know how far it has extended either to the south or north; and it also appears to have passed, as it were, over some districts, and again appeared. On the Border counties of England and Scotland it was abundant, and committed severe depredations. Figures of the perfect insect, and its different stages, by Mr Westwood, accompany this paper.——VI. *Mémoire sur une Nouvelle espèce de poisson du Genre Histiophore, de la mer Rouge.* Par M. E. RUPPELL, M. D. Membre Externe de la Société Zoologique.—The description of *Hist. immaculatus*, Rupp., which that gentleman considers distinct from the three previously known species of the genus. The colours of this fish are of a uniform dull blue above, changing to silvery on the lower parts; the upper fins are blackish blue, the lower greyish and all spotless, with the exception of a dark mark on the pectoral at its lower part. The formula of the fins is—

P. 1 + 19 V. 3 + 0, D. 47 + 0, 0 + 7. A. 10 + 0,0 + 7. C. 5 + 17 + 5. M. 13. 7.

——VII. *On the genus* OCTODON, *and on its relations with* CTENOMYS, *Blain. and* POEPHAGOMYS, *F. Cuv. including a Description of a New Species of Ctenomys.* By E. T. BENNET, Esq. F. L. S. &c.—An excellent paper, entering in Mr Bennet's *own manner*, into the relations of the genera mentioned above, and illustrated by good figures of *Octodon Cummingii*, and *Ctenomys Magella-*

nicus. One thing we would remark of the very beautiful figures of animals which have from time to time appeared in these Transactions, the effect of the picture is destroyed by the introduction of the skulls and details of anatomy beside the figure; they would be much more efficient for reference, as bold wood-cuts, perhaps, not more expensive. The skull in the plate *of Macropus Parryi* is quite an outrage.

TRANSACTIONS AND PERIODICALS—*Foreign*.

Annales des Sciences Naturelles. Zoologie, MM. AUDOUIN et MILNE-EDWARDS. *Botanique,* MM. AD. BRONGNIART et GUILLEMIN. Crochard and Co. Paris, Mai, Juin, 1836. (Continued from page 413.)

1. *Zoology*.

THE few first pages in the Number for May are occupied with the conclusion of LESSON's memoir "*sur les Béroïdes.*"——RAVIUS *Observations anatomiques sur les Fanons, sur leur mode d'insertion entre aux et avec la membrane palatine.* These observations were made on a specimen of the *Balæna rostrata,* forty-two feet in length and twenty feet in circumference, which was cast dead upon the shore of Cayeux, near Saint Valery. A figure of the species is given, as also several illustrations of the anatomical details of the jaws and their remarkable appendages.——VANBENEDEN's *Memoire sur l'anatomie de l'Helix algira.* The differences between it and *H. pomatia* are summed up in the following particulars: 1. There are two ganglions representing the brain in H. algira, and four ganglions underneath; there is only a nervous ring without distinct ganglions, excepting perhaps a superior and inferior, in H. pomatia. 2. The real number of filaments issuing from the nervous ring is much more considerable, and the filaments more slender in H. algira than they are in H. pomatia. 3. The salivary glands surround the œsophagus in H. algira, and the stomach in H. pomatia. 4. The upper jaw or tooth is crenulate in H. pomatia, while in H. algira there is a single medial prominence. 5. The appendix of the penis, as well as the duct of the urinary bladder (so we translate "la vessie du pourpre,") is much longer in H. pomatia. 6. There is no "love dart" in the algira, and the bag which should contain it becomes a passage to the female organs. 7. The multifid vesicles are represented by a glandular body, without any appendix in the H. algira. 8. The urinary bladder is free and floating at the end of its canal in H. pomatia, and adheres to the oviduct in the H. algira.——DESHAYES *sur l'estimation de la température des périodes tertiaires en Europe, fondée sur le consideration des coquilles fossiles.* An ingenious application of conchology to the determination of some interesting points in geology. Deshayes, as is well known, arranges the tertiary formations in three groups, deposited in successive periods; and his investigations in the present paper lead to the conclusion that in the first of these periods—the Eocene of Lyell—the temperature of the globe was equatorial, and probably several degrees warmer than that of the present equator; that during the second, or Miocene period, of which the deposits occupy the centre of Europe, the temperature was like that of Senegal and Guinea, while the temperature of the third or Pliocene period, at first a little more elevated than ours in the Mediterranean basin, became latterly as low as that which now exists.——HODGSON *sur les Chèvres et les Moutons sauvages de l'Hyma-*

laya. A translation from the Journal of the Asiatic Society of Bengal.——Rusconi *sur les changemens que les œufs des Poissons eprouvant avant qu'ils aient pris la forme d'embryon.* A translation from the Bibliotheca Italiana, and already noticed in our analysis of the Archives of Muller.——*Note additionnelle au memoire de* M. Duvernoy *sur quelques particularités du système sanguin abdominal et du canal alimentaire de plusieurs Poissons cartilagineux.*——*Analyse des travaux anatomiques, physiologiques et zoologiques, préséntes à l'Académie des Sciences pendant le mois de Mai* 1836: viz., Marion de Proces *sur l'Orang:* Bassi *sur la Muscardine*, a disease of the silk-worm, produced by the vegetation of a species of fungus (Botrytis Bassiana) which germinates in the living caterpillar, and invariably proves fatal in its developement: Blainville *sur les empreintes trouvées dans le grès bigarré:* Jacquemin *sur l'anatomie des Oiseaux:* Bourgery *et* Begin *sur la structure des poumons: Observations sur les Fausses-Galles par* M. Vallot.

The June Number contains only one original paper, viz.—*Memoire sur la vie intra-branchiale des petites Anodontes, par* M. A. de Quatrefages, who traces, with minute and scrupulous care, the changes which the ova undergo, from the period of their entrance into the branchiæ, until the young Anodontes are entirely separated from their parent. It has been long a disputed question, by what passage the ova, on their issuing from the ovary, got access to the branchiæ, for no anatomist was able to discover any ducts or pores indisputably appropriate to such a purpose; and no wonder, since M. De Quatrefages appears to have ascertained that the ova are first expelled from the body through the anal tube, and again sucked in by the stream of water which flows in between the branchial lamellæ for the purpose of respiration. This stream deposits them in the folds of the *external* lamellæ, which are the first to receive the water. Here the ova insinuate themselves (it is not mentioned how) into the *loculæ* or cells of these organs, which are loaded with them disposed in régular series, while very few, or more commonly none at all, are to be found in the internal branchial lamellæ, or in the cloak. A moderately sized Anodon will lay, it is calculated, rather more than 14000 ova, and a larger individual not less than 20000. They are expelled at intervals of half and three-quarters of an hour in small clusters, and the process of oviposition may last for twenty-four hours at least.—Without translating the author, who is unusually concise, it would be impossible to communicate to our readers a correct idea of the changes which the ova experience in their developement, and which are carefully described and delineated, as these were observed from day to day; but the omission at present is less to be regretted, for we shall probably give a translation of the paper in a future number. We can now only remark, that the embryo young appear to remain about 125 days in the branchiæ when the mother delivers herself of her numerous progeny. The delivery occupies four or five days.—The rest of the number is filled with a translation of Mr Owen's paper on the *Entozoa*, from the Transactions of the Zoological Society; and of a paper, by Messrs Falconer and Cantley, on a new genus of fossil ruminant from the Himalaya mountains, named *Sivatherium giganteum.* The original will be found in the *Journal of the Asiatic Society of Bengal.*——In the analysis of the proceedings of the "*Academie des Sciences pendant le mois de Juin* 1836," there is a letter from M. D. Nervaux, in which he says he had seen a pair of Nightingales *(Rossignol)* remove their eggs from the nest when this was threatened to be inundated, and that the eggs, placed in a new nest, were afterwards hatched. The anecdote is exactly similar to one recorded of the Water-hen, by Mr Selby, in the proceedings of the Berwickshire Naturalists' Club. There is also a long extract from a Memoir of Geoffroy Saint-Hilaire on the Orang-Outang, written in a spirit which we greatly dislike, and with views strongly coloured by his favourite hypothesis (if he will allow us to call it so) of the unity of organization throughout the animal kingdom. This theory so fully possesses him, that it is almost impossible not to look on his observations and facts with a certain degree of suspicion; and in the conclusion to which he has been led, in the present instance, we can by no means concur. The Orang-Outang is with G. Saint-Hilaire neither man nor monkey,—a mixture of both,—and man must be classified in future with the Quadrumana. ——Guerin has observed under the abdominal segments of the *Machilis polypoda* some little membranous sacs, which he is of opinion are organs of respiration analogous to those which are found under the abdomen of many Crustacea, and which are placed at the base of the false abdominal feet. This view of the use of the sacs in the *Machilis* appears to be strengthened by the fact, that Latreille could discover no stigmata in his dissections of that insect, which this peculiarity of structure may perhaps prove to be the type of an osculant group, connecting the classes Insecta and Crustacea.—The Number contains, lastly, a short notice of Cuvier's *Leçons d'Anatomie Comparée*, of which new edition three volumes are published; and of Frederic Cuvier's *Histoire Naturelle des Cétacés*, already reviewed in this Magazine.

II.—*Botany.*

Memoire sus les Clostéries, par M. Ch. Morren.—An essay of much interest and sterling value, but we feel that any analysis, however minute, would give a very indistinct and scarcely intelligible view of it, unless we had the aid of the numerous figures with which it is illustrated. The learned professor embraces in his essay a history of all that has been done towards a kowledge of the tribe, which has been placed among infusorial animalcules by some, by others among the algæ, while others have maintained its mixed nature—the species being animals in their origin and vegetables in their mature and old age. Morren entertains no doubt that all the true Closteria are vegetables, allied to Zygnema, but he says that infusory animalcules have been mixed with them; and of the real Closteria the species have been erroneously multiplied, by Ehrenberg in particular, from inattention to the varied forms and aspects they assume in the course of their developement. The phenomena presented during this course are minutely traced and delineated in highly magnified figures; the bearing which these appearances, and the structure of the productions, have on various intricate questions in vegetable physiology is indicated with learning and ingenuity; and the errors of his predecessors corrected. One of these relates to the reddish points observable on the extremities of the frustula regarded by Ehrenberg as eyes, but which are, we may say, proved by Morren to be vesicular granules, probably connected with the propagation of the species.——Montagne *sur les plantes cryptogames récemment découvertes en France.*——*Animadversiones botanicæ nonnullæ, novorumque generum et speciorum diagnoses, auct.* F. E. L. Fischer et C. A. Meyer.——*Extraits du* Botanical Magazine *pour l'année* 1835.——Dupont *sur les caracterès génériques du Gypsophila saxifraga.*

Juin. Morren continues his admirable "*Memoire sur les Clostéries.*" In one chapter he explains how these interesting algæ are propagated by gemmules analogous to the buds of more perfect plants; and another is occupied with a detail of observations, which prove that they also produce seeds or at least seminal bodies, the result of a union between two or more individuals which connect themselves in the same way that the Zygnemæ have been long known to do. It seems that these *lowest* plants have their seasons too of semination,—the reproductive unions occurring only at two seasons of the year, viz. in April and June, but it is probable that the time will depend on the annual temperature of the place which is made the scene of observation. The gemmules are numerous and small, while the seeds are very few in number and large, so that were the Closteria to be left dependent on the latter solely for their diffusion or existence, they would speedily become extinct, *two* individuals being required to produce *one* fertile seed. No single Closterium can form a seed of itself; a pair is necessary, and yet each element of this pair, enclosing all the organic conditions necessary to reproduction, is in fact an hermaphroditical being. In each there are two utricles with reddish spherules—the male organ,—and two masses of chromules—the female organ. If it remain single, the spherules fecundate the divisions of these parenchymatous masses, which become then the gemmules; if it unites itself to another individual, the spherules fecundate the whole and undivided masses of the same chromule, which, by a force acting from the circumference to the centre, is raised to the condition of a seed. Morren concludes his paper with the following corollaries—" 1°. Il y a des êtres chez lesquels les organes de la nutrition forment seuls et à-la-fois les organes reproducteurs et les êtres reproduits."—" 2°. La formation des embryons végétaux, dans les algues, depénd d'une concentration de la matière organisée."—" 3°. Les embryons végétaux chez les algues, se formant sous l'influence d'une force organisatrice qui procede de la circonférence an centre."——Montagne *sur les plantes cryptogomes récemment découvertes en France.*——Spach, *Conspectus Monographiæ Hypericacearum.* The following table exhibits a distribution of the British species according to Spach's views:

Tribus Desmostemoneæ—Sectio Elodeineæ.
  Genus *Elodes:* sp. *E. palustris.*
Tribus Hypericeæ—Sectio Hyperineæ.
  Genus *Hypericum:* sp. * Holosopalum—*H. humifusum. H. quadrangulum.* * * Milleporum—*H. perforatum. H. dubium?* * * * Adenosepalum—*H. pulchrum. H.montanum.* * * * * Drosocarpium—*H. Carbatum.*
Tribus Hypericeæ—Sectio Androsæmineæ.
  Genus *Androsæmum* sp. *A. officinale.*
  Genus *Eremonthe*: sp. *E. calycinum.*

The remaining articles of the number consist of short reviews and extracts from the " Flora," and do not require in consequence to be indicated in this place.

The Magazine of Natural History. Conducted by J. C. Loudon. Vol. ix. Nos. for Nov. Dec. (Continued from p. 403.)

I. *Zoology.*

Westwood on the Nomenclature of Natural History, p. 561. We are at the very antipodes with Mr W. on this subject, which it appears to us has been anything but elucidated by the recent discussions to which it has given rise in England.——N. Wood's Reply to C. J.'s Remarks on the "British Song Birds," p. 566.——On the Habits of the American Flying Squirrel, (Pteromys volucella, *Cuv.*) by D. W. C. p. 568. A very pleasing paper.——Berkeley on the Occurrence of Dreissena polymorpha, *Vanbeneden*, in Northamptonshire, p. 572.——Blyth on the Birds observed, during the last four years, in the Vicinity of Tooting, Surrey; with Remarks on their comparative Numbers and Distribution, p. 622.——Clarke's Remarks on Lepas anatifera, p. 638.

In neither Number is there any original Botanical communication, excepting what is to be found among the "Short Notices," which are as various and numerous as hitherto. Of these, there is none we have read with so much pleasure as the Anecdotes of the late Mr Purton, author of the Midland Flora; and we do hope that, in the New Series of this Magazine begun with the present year, an effort will be made, by the industrious Editor, to supply us with similar, or rather more copious, notices of such lovers of Natural History as may be annually summoned to that bourne whence no traveller returns.

Entomological Magazine. London, October 1836.

The contents of this number are less interesting than usual, and the first eight pages are filled with a continuation of the "Wanderings and ponderings of an Insect Hunter," which, however, have nothing to do with Entomology.——Art. 11. Essay on Parasitic Hymenoptera. By A. H. Haliday, M. A., continued from page 59.——12. Some Scraps by the author of the Delta letters.——13. Notes on Diptera by Francis Walker. These record the habitats of several rare British species.——14. Researches on the insects injurious to the vine, known to the ancients and moderns, and on the means of preventing their ravages. By M. Le Baron Walkenaer, extracted from the Annales de la Société Entomologique de France. The first section only of this essay, containing the critical examination of the names given by the ancients to insects injurious to the vine is given; the remainder to appear in a subsequent number.——15. Additional notes on the order Thasynoptera. By A. H. Haliday, M. A.—— 16. Notes upon Diptera, and characters of some undescribed species of the family Muscidæ. By A. H. Haliday, M. A.——17. Verses on Spring.——18. Thoughts on the Study of Entomology.——19. A list of rare insects taken at Darenth Wood. By Members of the Society of Practical Entomologists, from June 20th to July 11th, 1836.——20. Description of the Genera and Species of the British Chrysididæ. By H. E. Shuckard, M. E. S.——21. Notes on the Butterflies questionably British.——22. Observations on the circulation of blood, and the distribution of the Tracheæ in the wings of *Chrysopa perla.* By J. S. Bowerbank. An interesting paper, accompanied by a plate of the wing of the insect and its blood-vessels. ——23. Proceedings of the Entomological Club.——24. List of captures at Lyndhurst and Ryde. By Sir John Lighton, and the Rev. G. T. Rudd. Among the Coleoptera are three distinct new genera of Staphylini, and Cicindela Germanica, &c.——25. Pith of Periodicals.

INTELLIGENCE.

ZOOLOGICAL.

Hersilia, Savigny.—This genus of spiders is remarkable, 1*st*, for having three joints in the tarsus, which is an anomalous fact in its class, and 2*dly*, for the smoothness of the claws, for the claw of every other known spider is toothed or pectinated. These curious deviations from the ordinary structure are undoubtedly accompanied with corresponding peculiarities in the habits of the species, but with these habits we are unacquainted. Three species are known, one a native of Egypt (Cairo,) the others of India, having been sent from Bombay, and the coast of Malabar.—*Guérin, Mag. de Zoologie.*

Pleurotuchus, nov. gen.—Characterized at p. 142.—Mr J. E. Gray informs us that this is synonymous with his genus *Cicigna* in Griffith's edition of the "Animal Kingdom," and with the *Pteropleura* of Weigmann.—Edits.

Upupa Epops.—A beautiful specimen of the Hoopoe was shot near Coylton in Ayrshire on the 16th of October 1836.—*P. W. Maclagan.*

Falco rufipes.—A fine mature male was shot on the Durham coast between South Shields and Marsden rocks, in the middle of last October. It was in company with another, which unfortunately escaped. The stomach was filled with coleopterous insects.—*Albany Hancock.*

Motacilla neglecta.—A male specimen of this interesting species was shot a little west of Newcastle on the 1st of last May. It was with another, probably a female; and from the lateness of the season it is likely they might have bred in the neighbourhood. When my brother was in Norway he met with several individuals of this species, but procured only one. It appears to be the common bird of that part of Europe, and is so perhaps over the whole continent, the *neglecta* being the species described by the continental writers as the *flava* of Ray.—*Albany Hancock.*

Regulus ignicapillus.—An individual of this beautiful little bird was taken on the rigging of a ship five miles off the Norfolk coast in the early part of last October.—*Albany Hancock.*

Larus minutus.—A specimen of this bird, in the first plumage, was killed at the mouth of the river Tyne last September.—*Albany Hancock*, Nov. 21, 1836.

Hipparchia blandina.—Five specimens were captured about the 21st of August 1836, at the foot of Whernside in Craven, Yorkshire, by Abraham Clapham, Esq., a pair of which were presented by him to the museum of the Leeds Phil. and Lit. Society, and one to myself.—*Henry Denny.*

Luminosity of the Sea and Cholera.—From 1810 M. Surivay had observed the phosphorescence in our seas to be exhibited with the same characters every year during the summer season, but it was interrupted in the waters of the channel (De la Manche) when the cholera morbus prevailed at Havre and its vicinity in the month of May, June, and July 1834. [*] Several naturalists of the French capital, who are in the habit of visiting our harbour from season to season, and who had been observant of the phenomena, confirm this remarkable fact; and the whole city is witness to the sudden and very general mortality of the fishes kept in our preserves of brackish water which then occurred. All the eels and flat fishes came to the margins and died. M. Surivay examined with the microscope some drops of the water become a little putrid, and he ascertained that its slight blood-tinted colour depended on the increase of different kinds of infusory animalcules.

The diffused phosphorescence observable in our seas during the summer, M. Surivay attributes to the prevalence of a minute species of medusa *(Noctiluca miliaris,)* which he has described and figured in *Guerin's Mag. de Zoologie.*

Parmacella, Cuvier—MM. Webb and Vanbeneden have attentively examined the American mollusca reputed to belong to this genus in the rich collection of the late Baron de Férussac, and the result is the establishment of a new genus (*Peltella*) for their reception, the organic differences between them and those of the old continent being so considerable as to justify their separation. This division besides has the advantage of fixing in a precise manner the geographical distribution of the two genera. The Parmacellæ appear to belong more particularly to Northern Africa, one species only having been met with at the western extremity of Europe, and in one of the warmest regions of the Iberian Peninsula. We may then presume, that when the *Limacidæ* of the north of Africa are better known, the group to which they (the Parmacellæ) belong will present a series of species similarly conformed, and replacing in those climates the slugs of our temperate regions. The European species is minutely described and figured in a late No. of *Guerin's Mag. de Zoologie.* It was found on the hills of Alcantara behind Lisbon, feeding on the young shoots of *Cochlearia acaulis*, and is characterized as follows:

Parmacella Valenciennii, corpore toto fulvo, reticulatim rugoso; concha scutello obvoluta, tenui, diaphana, fragilissima; spiræ rudimento instructa, basi motaria amditu sinuata.—*Webb and Vanbeneden in Mag. de Zoologie.*

On the sexes of some Crustaceans.—It is to be observed that, in regard of sex, the Cancroïdea differ not only in being male and female, but there are also barren or spurious females, of which the broadly-trigonate abdomen is narrower than in genuine females, although broader than in the males. These are not to be confounded with young females whose abdomen, as in the Majaceæ, is flatter than in the adults, for of several species there are both barren and fruitful individuals of the same age. The Cancroïdea and Matutoïdea are hitherto the only families in which these sterile females have been noticed. *Portunus* (Neptunus) pelagicus, sanguinolentus; (Amphitrite) gladiator, hastatoides; (Charybdis) miles, 6-dentatus; (Thalamita) truncatus; *Ocypode* (Macrophthalmus) japonica; (Helice) tridens; *Grapsus* (Erischeir) japonicus; (Grapsus) marmoratus have afforded specimens of them. The form of the abdomen of the spurious females is trigonate in all the Portuni, but in P. sexdentatus the joints are arched on the side, and constricted at the apex and base; in Oxypode and Grapsus, differing from the former, it is wider than the half of the breadth of the sternum, while of a genuine female it occupies the whole breadth, and the apical joint is trigonal not dilated. The ovigerous appendages, or, as their use would warrant us in calling them, the spurious feet, are fringed with long hairs in the females, but on the contrary in the neuters they are either smooth or very shortly hairy. The organs of the body agree mostly with those of the females, but Portunus miles offers a difference in the claws, and P. truncatus both in the claws and front.—*W. De Haan in Siebold's Fauna Japonica. Crustacea*, Part ii. p. 36.

---

[*] The exact year, as well as the name of the author's place of residence, is omitted in the essay from which this notice is extracted.

Arvicolæ.—M. Edm. de Selys-Longchamps has published a short monograph of the species of *Arvicolæ* found in the vicinity of Liege, and has given the characters of two species which he considers new and distinct. We add the descriptions in his own words, to serve for comparison with the species of Britain.

" *Campagnol souterrein, A. subterraneus, Longch.*—Oreilles médiocres, entourées à leur base de poils qui se font paroitre cachées quand l'animal est en vue. Yeux tres-petits (une fois plus petits que ceux du Mus arvalis, Lin.) Queue d'une longeur égale au tiers du corps; bicolore, cest-a-dire noir en dessus et blanchatre en dessous (du moins dans les individus adultes,) pieds couverts de poils courts d'un gres noiratre, pelage d'un gris noiratre plus ou moins foncé en dessus, d'un gris blanchatre en dessous. Dens incessores d'un jaune foncé chez les vieux. Longeur du corps 2 po. 9 l.; de la queue 1 po. 2l.; totale 3 po. 11 l. 15 Vertebres à la queue; 13 paires de cotes—Ce campagnol se trouve sur la bords du Geer, de l'Ourthe, &c. Il frequente les jardins à legumes, situes dans les terrains un peu humides peut-etre aussi les prairies. Il vit toujours souterrain.

" *Campagnol roussatre, A. rufescens, Longch.*—Queue d'un longeur egale à la moitie du corps; bicolore, cest-a-dire* noiratre en dessus, blanche en dessous. Yeux prominens. Oreilles assez longues, pieds blanchatre, pelage d'un roux ferrugineux assez vif sur le dos. gris cendré sur les côtes, blanchatre en dessous. Longeur du corps 2 po. 9 l.; de la queue 1 po. 4½ l.; totale 4 po. 3 l.—16 vertebres a la queue, 13 paires des cotes—cette description n'a été fait que d'apres 2 individus pris dans un petit bois à Longchamps sur Geer."—L'Instit. 16 Novr. 1836.

Bones of the Camel found in a fossil state.—M. de Blainville has announced to the Royal Academy of Sciences at Paris, that he has learned from an individual who has lately returned from India, that the fossil remains of the camel have been found in the deposits of the lower ranges of the Himalayan mountains. The remains alluded to consist of a cranium, which was found in a very hard sandstone about two miles from Ramghur, and six from Pingon. This head, almost entire, appears to have belonged to the Dromedary, or single-humped camel. There has been also discovered in the same locality, the anterior part of the head of an animal intermediate between the *Anoplotherium* and *Paleotherium* of the Paris Basin. And the tooth of a species of Mastodon, allied to the *M. angustidens*, Cuv., and which, if this opinion should prove correct, would show that the remains of the latter animal had been found in three quarters of the world, Europe, Asia, America.—*Instit. 9th and 16th Novr.* 1836.

---

* Mr Bell quotes this as synonymous with *A. pratensis*, Bail.; *A. riparia*, Yarr.

Migratory Birds in 1836.—In the northern parts of England the effects and influence of season upon the movements of migratory birds, has been strongly exemplified during the present year. The cold and ungenial weather during the months of March, April, and May, delayed the arrival of most of our summer visitants from ten to fourteen days beyond the average period of their first appearance, as deduced from a journal annually kept for more than fifteen years.

It was also generally remarked that they were much fewer in numbers, and that some species were altogether absent in localities where in previous years they had been abundant.

The departure of the *Sylviadæ*, as well as the *Hirundinidæ*, on their equatorial movement, has also been unusually early, no doubt strongly influenced by the low temperature of the season.

Before the 1st of September the most of the Warblers had disappeared, a few individuals of *Sylvia trochilus* alone remaining till the 8th or 10th of that month, and after the 20th of September, more than a month before their accustomed time, the *Chimney Swallows* and *Martlets* had entirely disappeared. It is worthy of remark, that the Crossbill, whose summer migrations extends to higher latitudes, were observed in Northumberland as late as the 2d of May, at which time the eggs in the ovary of the female were some of them as large as peas.

The Fieldfare (*Merula pilaris*) one of our winter visitants, arrived in large flocks on the 24th and 25th of the present month, being a fortnight or more before the average time of its appearance.

An extraordinary deficiency of the insect tribe, particularly Coleoptera and Lepidoptera, has been generally noticed throughout the north of England and Scotland, during the spring and summer just passed.—P. J. S.

Additions to the Entomology of the Edinburgh district.—The following coleopterous insects have been captured during the two last seasons; and as they are not contained in the Entomologia Edinensis of Messrs Wilson and Duncan, some record of them will not perhaps be considered devoid of interest.

Haliplus melanocephalus. Braid marshes. The species is described by Stephens as having the interstices of the striæ on the elytra impunctate; my specimens have a few scattered punctures, but differ in no other respect.

Hydroporus frater. Reservoir above south Queensferry, and in the fish-ponds at Newliston.

——— 12-pustulatus. Reservoir at south Queensferry; a single individual.

Hydrobius melanocephalus. Braid marshes.

Sphæridium scarabæoides—bipustulatum.

Trichopteryx minima. Wall-top, Dalmeny park.

Ips ferruginea. Wall-top, Dalmeny Park, two specimens only.

Hister neglectus—bimaculatus—nitidulus; all near south Queensferry.

Onthophagus ovatus. King's Park, in dung. This is a very interesting addition to our Fauna; a few specimens were taken early in 1836 by Mr R. N. Greville. It is the only species hitherto found in Scotland.

Aphodius contaminans.

Telephorus ochropus. Roslin.

Acalles ptinoides. Roslin. The Rev. W. Little and myself captured one specimen each.

Hypera fulvipes. South Queensferry. It seems really distinct from H. nigrirostris.

Apion pomonæ; rare. A. cæruleopenne; Queensferry; a single specimen. A. carduorum—sulcifrons—vorax—foveolatum.

Rhagium inquisitor. Roslin.

Haltica flava. Dalmeny Park.

Thyamis pallens—Pulex.

Macrocnema hyoscyami.

Mantura semiænea.

Chætocnema concinna.

Chrysomela pallida. A considerable number of specimens were taken at Roslin by the Rev. W. Little and myself, by beating the hazel bushes. C. hyperici. Juniper Green, on Hypericum hirsutum.

Phædon aucta.

Coccinella humeralis. On palings in the Meadows, along with C. dispar and variabilis.

Quedius pyrrhopus—picipennis.

Philonthus maculicornis,—Watsoni.

Othius pilicornis.

Gyrohypnus affinis—punctulatus.

Lathrobium rufipenne.

Oxytelus rugosus—nitens.

Stenus oculatus—cicindeloides ?—unicolor—picipes ?—gonymelas ?—Aceris—canaliculatus ?—lineatulus ?—lævior ?—lævis—pusillus; besides several individuals that I cannot refer to any species described by Stephens.

Lesteva testacea. Roslin.

Tachinus apicalis.

Tachyporus lateralis.

Conurus cellaris.

Bolitobius apicalis.

Among the rarer insects described in the Entomologia Edinensis, a single specimen has occurred of Microsaurus lateralis.

Edinburgh, Dec. 16. R. K. Greville.

BOTANICAL.

Agaricus cochleatus, Eng. Fl. v. ii. p. 69.—" Inverary" is the only recorded station for this rare Agaric in Scotland. It may therefore be worth while to mention, that I gathered it in great perfection, on November 17, 1836, in the plantation around Foulden House, Berwickshire.—G. J.

Additions to Cooper's Flora Metropolitana.—*Silene otites.*—This uncommon plant, in the vicinity of London, was discovered in Charlton Chalk-pit, Kent, last summer, by Miss S. Berkeley, Busk, and Finch, from whom I possess specimens.

Crocus aureus.—I also found this not very common species in the neighbourhood of London, in Charlton Wood, Kent, in company with Messrs Chatterley and Lee, who also met with it in a meadow in Battersea Fields. The locality in Charlton Wood is rather complicated, but I will give as good a description as possible. When you arrive in the lane on left hand just out of Charlton from Blackheath, get over the style by the first house on the right hand, and then about fifty yards on your right, get over the hedge into a valley, where there is a pond; lower down than the pond *Crocus aureus* is found on both sides plentifully in the proper season. This species is not mentioned in Lindley's Synopsis.

DANIEL COOPER.

Allan Cuningham.—This gentleman has been appointed Curator of the Sydney Botanic Garden in the stead of his brother, Richard Cuningham, who met an untimely end when exploring the interior of Australia. Mr Cuningham sailed from London in October last.

Marsiliaceæ.—M. Auguste de Saint-Hilaire has communicated to the Royal Academy of Sciences of Paris, a notice on the structure and developement of the reproductive organs of a species of *Marsilea* found in the vicinity of Agde. These observations have been made by Esprit Fabre, a gardener in the neighbourhood, and are sent to St Hilaire by M. Dunal, who has applied to the plant the name of its discoverer.

In *Marsilea Fabri*, there is seen at the base of each leaf a very short horizontal peduncle, to which a capsular involucrum is attached for the whole length, which the adherence of the peduncle makes appear as if sessile. If the involucrum be cut in two, the processes are seen in each half, which in another species have been taken for the divisions, and which separate the involucrum into the cells where the small globular or elliptical bodies are contained. The involucrum opens in two valves, and if one of them be detached, the peduncle is perceived articulated; and in the interior of the involucrum that part of the pedicelle above the articulation gives rise to ramifications which cover the reproductive apparatus. It is these which have been taken for the divisions, the ramifications subdivide themselves, and their extreme branches being delicate, are termined in a kind of small ears or heads.

From the opened involucrum springs a mucilaginous ring, which bears six or seven sessile ears, (those mentioned above.) The ring enlarging carries with it the ears, and breaks the communication between them and the *receptacle;* soon after one extremity of the ring detaches itself from the involucrum, is straightened and now becomes a peduncle with a naked extremity, furnished latterly with sessile ears. These are composed of two kinds of bodies, wedged against another, and arranged spirally, these M. Fabre regards, the one as the *anthers,* the other as the *ovules.*

The ovules, of the number of ten or fifteen in each ear, are small bodies terminated at one of their extremities by a narrow yellow nipple surrounded by a sort of prominent hood, which the nipple passes. The interior of these bodies is filled with a liquid in which numerous granules swim. The terminal nipple is always turned towards the anthers; these are small bodies found in a membranous bag, in which there are numerous grains of pollen, which when crushed under the microscope, are seen to throw out spermatic granules of great delicacy.

But it may be asked, on what proofs do MM. Fabre and Dunal assert, that the bodies which they name *ovules*, are fecundated by those which they call an-

theres? M. Fabre has enclosed the antheres and ovules in separate vessels, and both have remained without change till decomposition commenced. On the contrary, when these bodies were placed in the same vessel, he perceived the divisions of the anthers to burst, and the grains of pollen to be carried around the nipple of the ovaries; he saw the ovules detached and fall to the bottom of the water; in short, he saw a little stem implanted in the earth by its extremity spring from the nipple, soon after a fine thread has risen from its extremity, (a thread which was in reality a cotyledon), and other leaf stalks have successively spread, terminated by two, three, and even four leaflets.

The conclusion which M. Dunal has thus arrived at, after comparing these curious facts, with what had been previously written regarding the Marsiliaceæ is, that they should be removed from the Class Cryptogamia and placed among the Phanerogamous plants.—*L'Inst. 16th Nov.* 1836.

Pilularia globulifera.—The general description of the involucre of Pilularia, and the very different seed-like bodies therein contained, is familiar to most botanists, and is for the most part correctly given by modern writers; but the nature and functions of those bodies have been frequently the subject of contradictory statement, some authors attributing to the smaller, the office of stamens, and to the larger, that of pistils, whilst others have denied both, and, to avoid a difficulty, have imagined that the smaller are abortive seeds.

The well-marked distinction in structure, size, shape, and situation, within the involucre, in all stages of growth of these bodies, and the smaller or granules not being observed in many experiments to make the least effort at germination, are grounds sufficient to justify the conclusion that they are not abortive seeds, but that they perform some peculiar office, and the probability of that office being analogous to that of anthers in Phænogamous plants. The result, too, of Mr Dickie's experiments[*] shewing the presence of starch and a fluid resembling a fixed oil its properties in the true seeds, or "thecæ," as they have been called, (which is evidently an improper term since each "theca" is one entire seed, having one germen, and producing but one plant) is a valuable addition to the distinguishing characters of these bodies. To ascertain the manner of germination, some seeds of Pilularia were placed in water in watch-glasses—seeds by themselves, and seeds with granules in separate glasses—and in a few days the seeds in both vessels were swollen about the apex,[†] which became of a blackish-brown colour, and a green point soon presented itself through the apex in a line vertical to the axis of the seed, and became a leaf, which having attained about half an inch in length, a white radicle appeared in a directly opposite line. When the root had attained rather more than half an inch in length, the young plants withered and died, probably from exposure to too much light, and being deprived of other advantages which soil would afford. Accordingly, a glass dish was nearly filled with mud and water, and covered with a bell glass to prevent evaporation. A considerable number of seeds were placed on the mud, and some buried a little below the surface; germination commenced in a few days; but in this experiment the first leaf proceeded at right angles to the axis of the seed. The leaf in this experiment also preceded the radicle. In a week or more, a second leaf appeared, and in about the same length of time a third with a rudiment of a horizontal stem proceeding from the point of union between the radicle and first leaf. The seed or rather the external coriaceous covering adhered for many weeks. The number of leaves and roots previous to the developement of the stem, is various, in different individuals. The first leaf is straight from its earliest appearance, but all the future leaves are slightly coiled, as in the young fronds of ferns. It is observed that in all cases the embryo proceeds from the same determinate point of the seed. The circulation of the sap seems to be carried on by Exosmose and Endosmose, as the substance of the leaves and stem consists chiefly of elongated cells of various dimensions, their extremities being closed by partitions; but in the centre of the leaf there is a branch of vessels which appear to be ducts of very minute size. No spiral vessels could be detected. Professor Lindley has observed ducts in Marsilea. The developement of the seminal or first leaf before the radicle is analogous to the germination of some of the Cyperaceæ, as according to Mirbel in *Scirpus Romanus, sylvaticus, &c.*

---

[*] See No. IV. of this Magazine.

[†] The upper part of the figure in Mr Dickie's paper represents the apex.

The habit of Pilularia also resembles that of some of the same order. When it is considered that so many of the essential characters of the Cellulares do not apply to the Marsiliaceæ, as in the subject of the above observations, the embryo proceeding from a determinate point of the seed, the vascularity of the stems and leaves, there being no other order of the Cellulares having true stems, and the approximation to a sexual apparatus, it seems to point to the conclusion that this order is intermediate between the Monocoteledones and the Cellulares, or at least should stand first among the latter as Mirbel and some other Continental botanists have placed it.—*Lloyd.*

Contributions to the Flora of Ayrshire.

Teesdalia nudicaulis. Sandy fields, near Prestwich.
Lepidium campestre. Near Dunure Castle.
" Raphanus maritimus. Ailsa Craig—Mr Jas. Smith."
Silene Anglica. Sandy fields, near Prestwich—rare.
Spergula saginoides et subulata, Carrick-hill—very rare.
Radiola melligrana. Prestwich Moor, in many places.
" Lavatera arborea. Ailsa Craig—Mr J. Smith."
" Hypericum montanum. Banks of the Doon, near Cassilis—Mr Jas. Smith."
Hypericum elodes. Lochfergus—Irvine—not uncommon.
" Geranium columbinum. Near Maybole—Mr J. Smith."
Trifolium ornithopodioides. Shore near the mouth of the Doon, where seaweed has been—Dr G. M'Nab.
Ornithopus perpusillus. Sandy fields, frequent, as at Prestwich.
Lythrum salicaria. Carrick-hill, &c.—wet places, very frequent.
Sedum telephium. Rocks near Dunure, and elsewhere on the shore—frequent.
Sedum anglicum. Rocks, especially on the shore—common.
Rhodiola rosea. Rocks on the shore, south of the Heads of Ayr.
Saxifraga aizoides. Rarely with the preceding.
" Saxifraga hypnoides. In a glen, near Dalmellington—Dr G. M'Nab."
" Carum verticillatum. Near Dalrymple, and elsewhere—Mr J. Smith."

Eryngium maritimum. On the shore—abundantly.

Inula helenium. Dunure Castle.

Hypochaeris glabra. Sandy fields, near Prestwich.

Lobelia dortmanna. Not unfrequent in lochs, as at lochs Martnaham and Fergus.

Jasione montana. Pastures and heaths—abundant.

" Andromeda polifolia. Shewalton Moss—Mr J. Smith."

Convolvulus soldanella. Shore north of Ayr in plenty.

Lithospermum maritimum. Near Dunure Castle.

" Lycopus Europæus. Chapelton loch, and many other places."

Lamium intermedium. Field near the mouth of the Doon—Dr G. M'Nab. Waste ground in and about Ayr—frequent.

Scutellaria galericulata. Marshy places—frequent.

" Lysimachia vulgaris. Martnaham Loch—Mr J. Smith."

Centunculus minimus. On Prestwich Moor with Radiola millegrana, where the turf has been removed.

Polygonum aviculare, var. B. maritimum. On the shore—common.

Scilla verna. Near Dunure Castle—abundantly.

Potamogeton heterophyllus, without floating leaves. In Martnaham Loch.

" Ruppia maritima. Near Troon Harbour—Mr Smith."

Juncus maritimus. Troon Harbour.

Scirpus Savii. Near Dunure Castle—Dr G. M'Nab.

Carex limosa. Knockdon Loch.

" Calamagrostis Epigejos. Banks of the Doon, 1½ mile below Patna Bridge —Dr G. M'Nab."

" Elymus arenarius. Coast, four miles north of Ayr, sparingly—Mr J. Smith."

" Lycopodium inundatnm. Shewalton Moss—Mr Smith."

" Cryptogramma crispa.
" Hymenophyllum Wilsoni. } Glen near Dalmellington—Dr G. M'Nab."
" Asplenium viride.

Asplenium marinum. Maritime rocks—frequent.

PHILIP W. MACLAGAN.

Spiranthes autumnalis—I found plentifully in 1835, in the middle of the large sand pit leading out of the lower road between Greenwich and Woolwich. This plant is sometimes not to be observed for four or five years together, and then to flower regularly for a short time.—DANIEL COOPER.

Leucojum æstivum.—A meadow of this beautiful plant is to be seen at the bend of the river Thames, directly opposite to the Plough Tavern, Blackwall.—DANIEL COOPER.

Elaphomyces granulatus, Eng. Flor. v. ii. p. 306.—In a beech plantation near Foulden, Berwickshire, attached to the radicles of the trees. This, I believe, is a novelty to the Scottish Flora. It were desirable that the characters which separate this from the *Elaph. muricatus* were more tangible than they seem to be in Mr Berkeley's descriptions.—G. J.

Spartina glabra.—Specimens of Spartina glabra, a genus new to the British Flora, were presented to the Linnæan Society (Nov. 1, 1836,) by Dr Bromfield, by whom the plant was discovered during the past summer on the muddy banks of the river of Southampton, growing in great abundance, intermixed with *Sp. stricta*. The species had been previously found only in North America. It is now in such plenty in the Southampton station, that, if really introduced by ballast or other means, it must have been long since naturalized.—Phil. Mag. Jan. 1837.

MISCELLANEOUS INTELLIGENCE.

Medico-Botanical Society of London,—Earl Stanhope, president, in the chair.—A communication by Sir Robert Kerr Porter, forwarded through Sir Henry Halford, on the *Cinchunchulli*, or Ionidium parviflorum, was read. The paper embraced a botanical description of the plant, and the reports furnished by the medical men to the Venezuelan government on its use as a therapeutic agent, in the treatment of that scourge of the tropics, the Elephantiasis tuberculata. The celebrated Mutis gave the name Viola parviflora to the cinchunchulli, in which he was followed by Persoon, but Ventenat considered it an Ionidium, and Dr Bancroft of Jamaica, who has recently published a paper on the subject, gave it the name of Ionidium Marcucci, in honour of M. Marcucci, a gentleman who underwent much toil and danger, when searching for the plant. It is found at the foot of the Chimborazo, at Cuença, Canar, and Puraçé, in the canton of Popayau: the root is the part employed, and its sensible effects are, nausea, vomiting, perspiration, and diuresis. Several cases were narrated at some length, in which much advantage was derived from the use of the cinchunchulii, but it unfortunately happened, that in all those treated by medical men, the quantity of the drug in their possession was too small to enable them to effect a cure, supposing the remedy capable of producing it.

Botanical Society of London.—In our last Intelligence (page 415,) we noticed the institution of a Botanical Society in London. The following prospectus has since been sent to us by the attention of Mr Heathcot.—Societies for the cultivation of Natural History generally, for the cultivation of Horticultural Botany particularly, for the cultivation also of Medical Botany, are already in existence in this metropolis, but no Society especially devoted to general Botanical Science has hitherto been instituted. The advantages of a Society of the last-mentioned description, will probably be admitted by every one who has the slightest acquaintance with Botany, and will without doubt be acceptable to all who are desirous of obtaining information on the various subjects which will necessarily come under the consideration of such a Society.

A number of gentlemen, having seriously considered the many desirable results which such a Society cannot fail to produce, and having fully decided upon the necessity, have instituted, "The Botanical Society of London," for the promotion of the following objects, viz.—

I. To concentrate the labours of individual Botanists, by holding stated Meetings in some central situation, with as little expense as possible to the Members, where each may communicate his information, and receive that of others in return.

II. To read original papers, and translations of Foreign Memoirs of importance, on Botanical subjects, at the Ordinary Meetings of the Society.

III. To examine and describe all plants that have not hitherto been accurately described, and to communicate the results at the Ordinary Meetings of the Society; and by a separate examination of the same plants, by different persons, produce a series of accurate descriptions of genera and species, which could not possibly have been done without such a co-operation of scientific botanists.

IV. To publish these descriptions and other transactions, as often as may be deemed expedient.

V. To form Herbaria of British and Foreign plants, for the reference of the Members, and exchange with other Societies or individual collectors, and thus be the means of producing many valuable Herbaria, which otherwise would not have been completed or even commenced.

VI. To form a Library and Museum.

This Society consists of Resident, Corresponding, Foreign, Life, and Honorary Members.

The Annual Subscription of Resident Members is fixed at One Guinea, of Corresponding Members at Half-a-Guinea, and after the Society has been established Six Months, each new Member of these two Classes shall pay an admission fee of Half-a-Guinea.

Another prominent feature of this Society is, that Ladies are eligible as Members, it being well known that there are many who have devoted their attention with success to this delightful study, and whose occupations often leave them much leisure for observation and research.

The following officers have been appointed; the names of the others when elected will be published in a subsequent Prospectus.

Council.

George E. Dennes, Esq. 5, Great Vine Street, Golden Square.
Joseph Freeman, Esq. Stratford, Essex.
Charles Johnson, Esq. Professor of Botany, Guy's Hospital.
Dr Macreight, Professor of Botany, Middlesex Hospital.
Henry Ashton Meresom, Esq. Guy's Hospital.
W. H. White, Esq. 4, Worship Square, Finsbury.

Treasurer.—John Reynolds, Esq. 23, Chadwell Street, Islington.

Curator.—Daniel Cooper, Esq. 82, Blackfriars Road.

Honorary Secretary.—W. M. Chatterley, Esq. 82, Blackfriars Road.

The Society will hold its Meetings every alternate Thursday.—The Meetings will take place on

Thursday, . . .	November	3.	At their rooms Adelphi Chambers, 11, John Street, Adelphi, next door to the Society of Arts.
„ . . .	„	17.	
„ . . .	December	1.	
„ . . ,	„	15.	

N.B.—Communications may be addressed (post paid) to the Secretary as above, or at Adelphi Chambers.

The second meeting of this Society took place on Thursday evening, November 3, at the Crown and Anchor, Strand, J. E. Gray, Esq. F. R. S. in the Chair. The minutes of the last meeting were read and confirmed. Several presents to the Library and Herbarium were also announced. The Society then fully considered the necessity of taking apartments, plans of which were laid before the Members by the Council, when they decided upon holding their future meetings at Adelphi Chambers, 11, John Street, Adelphi, next door to the Society of Arts. It was proposed and carried unanimously, that the anniversary meeting be fixed for the 29th of November, the birth-day of our illustrious countrymen and botanist, John Ray. This was received with most enthusiastic applause by a crowded assembly of both ladies and gentlemen. Mr Daniel Cooper, author of Flora Metropolitana, &c. the founder and curator of the Society, read an interesting paper on the effects of light upon some of our domestic plants, which excited great interest, more particularly with the ladies. Mr D. Cooper also related the results of some interesting experiments on the imbibition of coloured fluids by the roots of plants, and produced many interesting specimens of general interest to the vegetable physiologist. There were several eminent metropolitan botanists present, among whom were Sir W. Kelburn, Dr MacIntyre, Dr Lewis, Mr Charles Johnson, Mr D. Cooper, &c. &c. The thanks of the Society having been expressed to Mr D. Cooper for his interesting papers, the chairman then stated that the next meeting would take place on Thursday, November 17th, at Adelphi Chambers.—A. HEATHCOT.

BERWICKSHIRE NATURALISTS' CLUB.—It may safely be said, that at no period in the history of our country has a love for physical science in general been more widely diffused than it is at present; and certainly at no previous period was it ever more zealously or successfully cultivated. In the department of Natural History in particular, the truth of this statement must be obvious to every one at all acquainted with the subject. The very circumstance, indeed, of the establishment, within a very limited number of years, of so many associations in all parts of the island for the prosecution of this delightful and most rational study, is of itself a sufficient proof of the interest and attention with which it is now almost invariably regarded. And to these associations it doubtless is that we are, in a very great measure at least, to ascribe the present flourishing state of this science. The Berwickshire Naturalists' Club is one of these late associations, having been formed between five and six years ago; and as it is now beginning to be pretty extensively known, and is in its plan or constitution somewhat different from almost every society which has been instituted for a similar purpose, a brief notice of its rise and progress may not be uninteresting.

While other societies contented themselves almost entirely with reading and hearing communications, and confined their meetings to one particular town or city, it suggested itself to one or two Berwickshire naturalists who were in the habit of occasionally meeting each other in their rambles after nature's beauties, that if a county or district association could be formed, and the attention of that association could be given exclusively to the natural history of its own district, meeting for that purpose periodically in different parts of the district, and devoting its attention as much to actual excursions or out-of-door work, as to the reading and discussing of papers and communications, not only would the natural phenomena and productions of the district be more minutely and successfully investigated, but, by the same means, a greater number of facts, and a greater amount of information, would be added to the general stock of natural knowledge daily accumulating throughout the land. No sooner was the suggestion or proposal communicated to other companions in the same pursuits, than it was at once and cordially approved of; and the result accordingly was the formation of a district society under the title of the Berwickshire Naturalist's Club, which held its first meeting in the neighbourhood of Cockburnspath, September 22d 1831. Though at the first meeting only nine gentlemen were present, yet it is gratifying to be able to add, that the number of members now amounts to forty; and it is equally pleasant to be able to state, that the same harmony of feeling, the same zeal and ardour in the pursuit of nature which led to the institution of the club, and characterized its first meetings, still continue to animate and to characterize every succeeding one. The object of the club being to gain as accurate and complete a knowledge as possible of the natural productions of the county (and its immediate neighbourhood), and its constitution being partly scientific and partly social, its meetings, exclusive of the winter meeting (which is always at Berwick,) are held four times a-year in different parts of the district; the members meeting at breakfast, devoting the next five or six hours to an excursion through the most interesting parts of the neighbourhood, and then assembling to a comfortable dinner, after which, communications and notices, both verbal and written, are received and listened to; discoveries are recorded, and that rational, happy, and mutually improving conversation is carried on, the tendency of which is, not only to expand the mind and improve the heart, but to render us also happier with each other, and happier with ourselves. Nor have the hopes of the founders of the club been at all disappointed as to the success which was likely to ensue from its institution. It has been the means of adding very many valuable facts, not only to the natural history of Berwickshire, but to that of the country generally. It has proved the district, the field of its investigations, to be one most rich and interesting in almost all the departments of natural history. It has published also, annually, for four years past, a small volume of its transactions; and from the zealous as well as the harmonious spirit by which it still continues to be animated, there is every reason to believe that it will go on increasing in knowledge, reputation, and prosperity.

The last meeting of the Club was held December 22d, at Berwick-upon-Tweed,—P. J. Selby, Esq. of Twizel House in the chair. After the reading of the minutes of former meeting, and other routine business, the following communications were read:—1. A paper by Mr Henderson "on the popular Rythmes of Berwickshire."—2. A paper by G. Darling, Esq., "on the Black Turnip Caterpillar."—3. A communication received from Sir Thomas Brisbane, entitled, "Practical observations on the Par, by James Kerse, fisher, Bowhill."—4. A paper from the Rev. T. Cook, illustrative of some facts connected with the early history of the Borders; and 5. Contributions to the Flora of the district, by Miss Bell and Dr Johnston. A number of rare and interesting birds from New Holland were also exhibited, and Dr Johnston's Collection of Land-Shells, which the Club were invited to examine, was viewed with much attention and pleasure. The rarest and most valuable contribution, however, at this meeting, was a specimen of the Mullus barbatus, or Plain red Mullet, exhibited by the Rev. A. Baird, of Cockburnspath, who procured it from one of the fishermen in that parish, in the month of August last. It was taken in a herring-net, and was a beautiful and full-grown specimen. Though this fish has for some time occupied a place in the British Fauna, it may be stated that its claim rests merely on a vague remark of Mr Pennant, who acknowledges that he never saw it. A single specimen, it is believed, is in the British Museum, but it is uncertain whence it was procured. The individual exhibited on this occasion therefore may be considered as the only authentic British specimen which has been preserved of this famed and beautiful fish. The next meeting of the Club was fixed to be held at Houndwood, on the first Wednesday of May, 1837.

TWEEDSIDE PHYSICAL AND ANTIQUARIAN SOCIETY.—A Quarterly Meeting of this Society took place here on Monday last, Sir Thomas Makdougall Brisbane, Bart., the Society's President, in the chair.

The list of donations to the Museum received since last meeting was read over, and the thanks of the Society were unanimously voted to the donors. We may specify the following as among the most important of the new acquisitions:—

From Walter Elliot, Esq. Wolflee.—Forty-six skins of birds from India, some of them of rich and beautiful plumage.

From a friend to the institution.—A collection of ancient and modern British coins. Among these are a Penny of William the Lion; Penny of Henry II.; the regal and episcopal Durham Pennies of Edward I.; the Half Groats of Elizabeth and Henry VIII.; &c. &c.

From his Grace the Duke of Roxburghe.—1st, Stuffed specimen of Crested Cormorant; 2d, The male and female Mergansers; 3d, Male and female Cornish Chough; 4th, Male Royston Crow.

From Sir Thomas Makdougall Brisbane, Bart. of Makerston.—1st, Two stuffed specimens (male and female) of the Passenger pigeon; 2. Specimen of the Harlequin Duck; 3d, Specimen of the Snowy Owl. The two last are especially interesting as rare and beautiful specimens of the British Fauna, though the individuals sent to the Museum were not shot in this country.

From Adam B. Boyd, Esq. of Cherrytrees.—A curiously marked pyebald Mouse, killed at Cherrytrees.

From Mrs Tait, Whitehill.—Collection of Eggs of the common domestic Fowl, presenting some singular varieties.

Other interesting and appropriate donations were received from Mrs Redpath; Major Watson; Mr Charles Douglas; Miss Jane Wilson; Mr Fulton, Hatchednize; Mr W. Wheelans; &c. &c.

Birds and Quadrupeds for preservation were received from Lady Polwarth; the Duke of Roxburghe; Mrs Roberton, Ladyrigg; Mr Boog; Mr Beckwith; Mr Peter Darling; Sir Thomas M. Brisbane; Mr Stuart; Mr Forrest, gunsmith; &c. &c. This is a kind of contribution which the Society is always glad to acknowledge; and we hope that its friends will continue their attentions. If they would take the trouble of visiting the Museum—and to those who will make allowances for the Society's limited means, and the short period of its existence, it is now worthy of a visit—they would best ascertain what are the deficiencies, numerous as they are, which still remain to be filled up. It gives us pleasure to learn that a gentleman is now engaged in making a collection of the Fishes of the district, which we hope to see soon occupying a place in the Museum.

The following office-bearers were elected for the ensuing year:—

PRESIDENT.

Sir Thomas Makdougall Brisbane, Bart., K. C. B., &c.

John Hodgson Hinde, Esq., M. P. Major General Elliot of Rosebank, P. J. Selby, Esq. of Twizell House, Robert Wilkie, Esq. of Ladythorn,	Vice-Presidents.

Dr Wilson, Kelso, Secretary.
Mr Currie, Kelso, Treasurer.

Dr Douglas,	Curators.
Major Watson,	
Mr Stuart,	
Mr Smith,	

Mr Robert Frain, Trows, Hon. Artist.

The thanks of the Society were voted to those gentlemen who had acted as office-bearers during the past year, and the meeting expressed its satisfaction with the progress which had been made with the Museum while under their charge.

The Treasurer being absent from the meeting, no account could be given of the state of the Society's funds, but we believe we may report them to be in a prosperous condition. Upon the whole, the success of the Institution continues to be such as is highly creditable to the state of society in the district in which it originated and has been hitherto supported. We trust that the advantages to be derived from it will yet make themselves more and more decidedly felt and acknowleged.—*Kelso Mail.*

Register of the Thermometer for 1856, kept at Applegarth Manse, taken at 9 A. M. and 9 P. M. Long. 3° 12' W Lat. 55° 15' N.—Height above the sea 180 feet—Distance from the sea 10 miles—Rain-gage, 10 feet from the ground. ●

Days.	JAN.		FEB.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUGUST.		SEPT.		OCT.		NOV.		DEC.	
	a. m.	p. m.	a. m.	p. m.	a. m.	p. m.	a. m.	p. m.	a. m.	p. m.	a. m.	p. m.	a. m.	p. m.	a. m.	p. m.	a. m.	p. m.	a. m.	p. m.	a. m.	p. m.	a. m.	p. m.
1	34	29	33	31½	31	33	39½	34½	43½	35½	54½	48½	54½	55	55½	48½	51½	49	40½	43	35½	42½	31	40
2	30	31	30	31	36½	33	37½	35½	44½	36	54½	49	59	55½	55½	52½	50	44	43	40	44½	36	46	42
3	34	40	35	35½	36½	38	40	32	45½	38	59½	54	55½	54	54½	54½	52	51	43½	43½	41½	37	42	44
4	43	46	37½	30	40	38½	34	38	47½	42	52	52½	65	52	58	49	56	54	46	40	34	31	43½	41½
5	46	45	26	36	35½	35½	39	42	46½	41	53½	48½	59½	60	55	53½	48	48	42	40	33	32	44½	44
6	42	40	38	33	34	38½	44	39½	48	42	53½	48	58	51	61	58	52	44	44½	42	33½	34	42	46
7	39	37½	33	30	38½	33	41	34½	54	44	54½	48½	56	51	63½	54½	53	47½	50½	51	30	28½	42½	38½
8	40	38	39	45	37½	31	40½	38½	51	44½	53	52	61	54	55½	50	50½	48	52½	44	26½	28	37½	36
9	32½	32	41½	36	35½	32	44½	39½	53½	48	53½	52	55	58	56	52½	47½	40	45½	46½	42	43	32½	32
10	30	29½	33½	34	35	36	42	30½	56	50	54½	52½	60	59	62	57	45½	42	46	45½	44	33	35	33
11	29	26	28	32½	36	36	40	42	58	47½	53½	50	59	54	62	60	49	47	45	44½	38	43½	30	24½
12	23	20½	39½	31½	40½	35½	46½	43	49½	46	54	52	54	49	58	59	49½	47	46	45½	28	44	29	40
13	32	38	30½	39	35	39	47	36½	48	48	55	54	51	50	62½	58	51½	43	45½	41	46½	40	38	39
14	40½	34	40	41	39	33½	41	48	56½	51	56½	58	53	50	62½	61	53	48	39½	45	37½	39	41	34½
15	30½	29½	42	40½	35½	34½	52	44	58½	47	68	64	52	49	63½	57½	52½	45½	46	48	38	43	27	37
16	22	30	43	30½	31	36	44½	41	59	56	57½	54½	55	52	62½	55½	51	45	46½	40	42½	42½	37	38½
17	32½	35	31	34½	47½	40	44	42	66	56	62½	58½	53	48	56	52½	48	44	45	46	36½	38	40½	46
18	38½	34	35½	31	42	42½	44	40	58	50	54½	54½	50	54	57	50½	49	46½	51	46½	34½	32	46	46
19	23	29	29½	32½	44	42½	46	44	56½	56	60	52½	54	46	54	50½	51	42	47	45	35	37	44	40
20	32	37½	30½	31½	45½	42½	45	40½	63	52½	52½	47	50	50	54	48½	49	40	38½	44½	38	32	34	40
21	39	41½	38	40½	42	42½	46	42½	60	50	53	47	59	49	51½	51½	44	38½	46½	45½	32	36½	42	44
22	40	39½	37½	34	43½	38	44½	38	56	46	56½	52½	55	50	52	40	45	49	48½	42½	30½	34	45	39
23	44½	42½	29½	34	40½	40	42½	38	43	40	54½	53	59	52	47	42	32	53½	48	49	34	34	29	28
24	40	32½	30	30	38	33½	44	38	47	46	55½	51	50	48	51	46½	54	52	50	46	30	30	30	26
25	34	42	32	26	37½	35½	43	41	59	50½	51½	48	54	52	52	52½	53	52	48½	44	30½	33	24½	21
26	42½	35½	28	23½	39	34½	46	36½	54½	52½	55	52	53	56	50½	47	55	54	47½	48	33	35½	23	23
27	33½	40	32	31½	38	32	43	40	57½	52	57½	55	56	56	50½	46	56	51	36	30	37½	46	26½	29
28	35	30	35	32½	33	32½	45	32½	62½	48	56	51	56	54½	54	44	50	46	30½	32½	42½	42½	28½	28
29	29½	26	29½	34	37	32	36	32	60½	54	55½	53	58	46½	50½	42½	46½	46	28	32	39½	42	30	27
30	31	28			36	36½	42	38	56	48	61	53	53	48	42	53½	41	38	27½	26	33½	30	29	27
31	34	34			38	34½			60	50			52	50½	55	54			24	29½			26	28
	38	$34\frac{6}{10}$	31	$33\frac{6}{10}$	38	$36\frac{6}{10}$	$42\frac{6}{10}$	30	$54\frac{6}{10}$	$47\frac{6}{10}$	$55\frac{6}{10}$	$52\frac{2}{10}$	$56\frac{1}{10}$	52	$55\frac{7}{10}$	$51\frac{7}{10}$	$50\frac{6}{10}$	$47\frac{6}{10}$	$43\frac{6}{10}$	$42\frac{6}{10}$	$36\frac{4}{10}$	$30\frac{7}{10}$	$35\frac{4}{10}$	$35\frac{6}{10}$
	Rain, $3\frac{6}{10}$ in.		1 inch.		3 inches.		$2\frac{1}{10}$ inches.		0		$4\frac{6}{10}$ inches.		$5\frac{1}{10}$ inches.		$3\frac{6}{10}$ inches.		$2\frac{8}{10}$ inches.		$2\frac{6}{10}$ inches.		$5\frac{1}{10}$ inches.		$4\frac{6}{10}$ inches.	

Medium temperature of the year, 43 6-10ths. Total rain, 37 9-10 inches. Medium temperature of 1855, 45 1-4th. Total rain of 1855, 33 6-10 inches.

● We have thought the above Table would be interesting to compare with that kept at St Bathans, published regularly in the "Records of Science."

MAGAZINE

OF

ZOOLOGY AND BOTANY.

ORIGINAL COMMUNICATIONS.

I.—*Notices of British Fungi.* By Rev. M. J. BERKELEY, M. A., F. L. S. (*Continued from page* 42.)

No. II.

38. *Agaricus hæmatophyllus*, n. s. Berk. Brit. Fung. Fasc. 3, ined.—On peat earth abundantly, in a north border, and amongst rock-work (in company with Ag. cristatus;) more sparingly and smaller in a hot-house, where it sometimes sprang from the wall itself, at Milton, Northamptonshire, where it was pointed out to me by Mr J. Henderson, at the beginning of October last. The same gentleman has since found it growing amongst loam in melon pits, and a single specimen has occurred to myself at Lambley Notts on a steep declivity, on loamy clay. The nearest affinity of this curious species, which belongs to the subgenus Lepiota, is with Ag. cristatus and Ag. meleagris, from which it differs essentially in colour, and in its approximate gills.

Solitary, or gregarious; often fasciculate. Pileus 1-1½ inch broad, thin, brittle, chocolate or olive-brown, clothed with minute raised scales, and copious meal of the same colour; flesh pale, not changing when cut. Gills varying greatly in breadth, rounded behind, quite free, but approximate, at first of a fine red like that of the gills of the best mushrooms, at length deep chocolate. Ring broad, fugacious, attached at first in ragged triangular laciniæ to the edge of the pileus, mealy externally like the pileus, of a beautiful pink within. Stem 1½ inch high, 1-2 lines or more thick, chocolate red when rubbed, but clothed with meal, red within, stuffed with white silky filaments, penetrating into the soil by means of a few white branched fibres; smell strong, like that of Ag. cristatus. The meal, under a strong magnifier, consists of globular vesicles, which are sometimes shortly pedicellate.

Tab. XV. Fig. 1. *a. a.* A. hæmatophyllus* nat. size; *b. b.* vertical section; *c.* meal highly magnified.

39. *Ag. erubescens*, Fr. Syst. Myc. vol. i. p. 32.—Amongst beech leaves in a wood near King's Cliffe, Oct. 7, 1836. Ag. carnosus, Curt. Sow., formerly referred by Fries to this species, is now considered by him Ag. maculatus, Alb. and Schw. At the time the English Flora was published I had not met with it, but a single specimen which occurred lately in one of the larch plantations in Sherwood Forest was sufficient to show that it was at least not a true Limacium, though I am not satisfied that it is so nearly related to Ag. fusipes as Fries (El. i. p. 17,) supposes. The present autumn has also furnished me with a sample of the real Ag. erubescens; and though, in some respects, similar to Ag. carnosus, it is at once distinguishable by its more robust habit, but especially by its possessing the characters of the subgenus Limacium.

Pileus 2½ inches broad, plano-convex, fleshy, compact, white tinged with rufous, slightly viscid; margin downy involute. Gills rounded behind, adnexed, rather distant. Stem 2-3 inches high, ¾ inch thick, curved at the base, thickest above, stout, firm, fleshy, mottled, within squamuloso-fibrillose; subglanduloso-squamulose within the pileus, which it resembles in colour. Smell scarcely any.

* 40. *Ag. cossus*, Sow. t. 121.—The difficulties respecting this species are stated in the English Flora. Having lately found Ag. nitens, Sow., which is also a true Limacium, I am enabled to state positively that it is quite distinct from the present species. Though exactly resembling Ag. cossus in outward form, it is quite destitute of its disagreeable smell; and when dried, the white turns to a dark foxy brown, as indeed is represented in Sowerby's plate. It still remains to be proved whether Ag. eburneus of continental authors be the same with Sowerby's Ag. nitens. I can find no account of such a marked change of colour taking place.

* 41. *Ag. fusco-purpureus*, Pers. Ic. et Descr. t. 4. f. 1-3.—The

---

* The specimens from which the figures were taken were scarcely so dark as the usual state of the species, in consequence of having been slightly touched by frost.

description of this species in the English Flora is by some mischance mixed up with that of Ag. pelianthinus. Both will soon be given in the Fasciculi of British Fungi.

42. *Ag. balaninus*, n. s.—On beechmast, Sept. 1836, King's Cliffe, Northamptonshire. An exquisite species, belonging to the section Calodontes of the subgenus Clitocybe, agreeing in many respects with Ag. marginellus, which appears to have been met with by Persoon only, and that perhaps not subsequently to the publication of his Synopsis. That plant is, however, very much smaller, and grows on fir-trees.

Pileus 1½ inch broad, convex subcampanulate, obtusely umbonate, at length more or less expanded, ochraceous with a slight tinge of amber, very minutely mealy, slightly rugulose carnoso-membranaceous; margin scarcely striate. Gills broad, rounded, quite free, with the exception of a connecting tooth, rather distant, pale, sprinkled and fringed with dull purple spiculæ; interstices veiny. Sporidia white, elliptic. Stem 2½ inches high, 1-2 lines thick, attenuated downward, flexuous, rigid, white, and mealy within the pileus, deep Sienna brown below, dark brown at the base, which is imbedded more or less in a spongy mass, by which it adheres to the mast, shining, quite smooth, fistulose.

Tab. XV. Fig. 2. *a.* Ag. balaninus, nat. size; *b. b. b.* vertical section; *c.* a section of the extremity of a gill highly magnified to show the spiculæ; *d.* sporidia highly magnified.

* 43. *Ag. undatus*, Berk. Eng. Fl. Vol. v. pt. 2, p. 51. Brit. Fung. n. 9.—The habitat of this species, as given in the English Flora, is small stumps and sticks. I now find the species very frequently in one locality, and there always upon the subterraneous base of decayed stems of Pteris aquilina.

* 44. *Ag. tuberosus*, Bull. t. 256.—Frequent opportunities of examining this species, under various circumstances, have convinced me that Acrospermum cornutum is not an autonomous fungus, contrary to the opinion entertained by me in the English Flora, but a mere disguised form of the plant. When growing on the gills of Agaricus adustus, it commences by a little white downy elongated granule, which gradually increases in length and breadth, becoming brown and quite smooth, resembling much the bulb of some species of Oxalis, and either gives origin at the apex to a stem and pileus, or suddenly stops in its growth without producing either, and remains dormant through the winter. In the first case, the stem of the Agaric is perfectly continuous with the tuber, as represented correctly, though rudely, by Bolton; occasionally, indeed, the tuber

is so little developed as to be nothing more than a slight incrassation of the base of the stem. In the second case, the perfect fungus is not developed till the ensuing year, when a crop springs up from the tubers, which are in general buried by fallen leaves or moss. The Agaric then springs indifferently from the apex, or any other part of the tuber, and occasionally more than one pileus is produced. It is to be observed that this Agaric often grows upon real Sclerotia, as it does upon other fungi ; and the tuberiform state is merely to be regarded as a form arising probably from excess of nourishment. While on this subject it may not be amiss to state that the tubers of Typhula phacorhiza and gyrans are true Sclerotia. The former I find on Sclerotium complanatum and scutellatum, the latter upon Sclerotium semen.

* 45. *Ag. racemosus,* Pers. Disp. Meth. Fung. t. 3. f. 8. Sow. t. 287.—King's Cliffe, Northamptonshire. Respecting this most singular production I have stated in the English Flora, in conformity indeed with a notion expressed by Fries, that I suspect it to be a monstrous state of the foregoing, which has frequently a branched stem. Having lately had the good fortune to meet with a few specimens, I am satisfied that it is distinct, as it turns almost black in drying. My specimens have not the pileus developed, and if it had not been for its being figured in that state, I should without hesitation have considered it a branched *stilbum,* so completely has it the characters of that genus, the little heads being hyaline gelatinous, and consisting of minute elliptic granules.

* 46. *Ag. vulgaris,* Pers. Tent. Disp. Meth. p. 25. Ic. Pict. t. 19, f. 3. Fr. Syst. Myc. V. i. p. 156.—On fir leaves, Sherwood Forest, October 1836. This species, it should be observed, is included in Loudon's list given in the Hortus Britannicus.

* 47. *Ag. pterigenus,* Fr. Syst. Myc. V. i. p. 160—The fungus described under this name in the English Flora is, as stated there, only a variety. The true plant, than which nothing can be more elegant, occurred in tolerable abundance in October last at Lambley, Notts, on dead stems of Aspidium filix mas. The colour varies in different individuals from bright orange-red to rose-colour, occasionally the upper part of the stem is brown. The gills are ornamented with a bright orange margin. The pileus in the young plant is oblong, oval, obtuse, minutely furfuraceous at the apex, marked with darker slightly anastomosing veins, which at length, in consequence of the quicker growth of the subjacent stratum, and the collection of the veins themselves into bundles radiating from

the centre, form striæ on the pileus. The stem under a high magnifier is often streaked with veins like the pileus.

* 48. *Ag. mitis*, Pers. Syn. p. 481.—Abundantly on branches of larch, lying on the ground in Sherwood Forest, October 1836. Upper stratum gelatinous.

49. *Ag. cyphelliformis*, n. s.—On the lower part of a dead plant of Pentstemon ovatum. Milton, Northamptonshire, October 1836. Apparently closely allied to no described species. Gregarious. Pileus 2 lines or more broad and high, altogether stemless, cup-shaped, hanging down, cinereous, very minutely strigose, especially at the base; margin paler, sprinkled with a few meal-like scales. Upper stratum gelatinous cinereous, beneath which the flesh is white and very thin. Gills pure white, rather distant, the alternate ones shorter, narrow, linear.

Tab. XV. Fig. 3. *a.* Ag. cyphelliformis, nat. size; *b. b.* do. magnified; *c.* a section, also magnified.

* 49. *Ag. cinnamomeus. d. croceus*, Fr. Syst. Myc. V. i. p. 229. —In a beech wood, King's Cliffe. The figure of Batsch A. squamulosus, f. 117, exactly represents my plant, which belongs to a variety apparently not before observed in this country.

50. *Thelephora spadicea*, Fr. El. V. i. p. 176.—On oak stumps, not uncommon in Northamptonshire. Easily known from every state of Thel. purpurea by its becoming blood-stained when scratched. I suspect that Sowerby had this species in his eye when illustrating his Auricularia tabacina, if indeed his plant be not altogether identical with it. Sporidia copious, pure white, oblong-elliptic.

* 51. *Phlebia vaga*, Fr. Syst. Myc, V. i. p. 428. El. i. p. 155.—On a decaying fallen branch, King's Cliffe. It is also noted as British by Loudon. Nothing can be more exact than the description given by Fries in his Elenchus.

52. *Clavaria juncea*, Fr. var. β *vivipara*, Fr. Syst. Myc. V. i. p 479. A. fistulosa, Bull. t. 463, H.—Amongst oak leaves, King's Cliffe. My plant is precisely what is figured by Bulliard, but I cannot help suspecting that it is an unusually luxuriant form of Typhula phacorhiza.

53. *Sclerotium truncorum*, Fr. Syst. Myc. V. ii. p. 252 —In various places in Northamptonshire, amongst moss on old stumps, generally forming the matrix of Ag. tuberosus.

54. *Sphæria cornicola*, Fr. Syst. Myc. p. 530.—On leaves of Cornus sanguinea, King's Cliffe.

55. *Asteroma veronicæ*, Desm. n. 778. cum icone.—On leaves of

Veronica officinalis, King's Cliffe. The analysis given by Desmazière exactly accords with my own observations.

57. *Sphæronema blepharistoma*, n. s. Berk. Brit. Fung. Fasc. 3. ined.—On the blackened gills of Ag. adustus in very wet weather, King's Cliffe, September 1836. This species is not only in itself extremely well marked, though at first easily regarded as a depauperated state of Sphæronema subulatum, but it is especially interesting on account of its peculiar characters, which throw light upon the real structure of that species. Dr Greville remarks, that in Sph. subulatum, the perithecium, previous to maturity, contains the sporidia mixed with a gelatinous pulp and a few filaments, which being evacuated along with the sporidia, were very obvious in several specimens he dissected. That the filaments, however, are not discharged with the other contents of the perithecia, I have completely satisfied myself, by induction first, and then by ocular demonstration, but that they originate on the outer surface of their tips, and are in fact the free apices of the flocci, of which the perithecia are composed. This appears very clearly to be the case on comparison with the species represented in the accompanying plate, in which the perithecium is made up of a single circle of filaments, whose bases are soldered together, and whose free apices form a beautifully ciliated orifice; whereas in Sphæronema subulatum, there being many circles of filaments, the orifice is furnished with a pencil-like tuft of filaments. In this case, however, if I mistake not, the orifice itself is not ciliated as represented in the figure; at least I have not seen it so. The filamentous structure of the perithecium in S. blepharistoma is easily traced almost to the base; in S. subulatum the filaments in each circle being more numerous and finer, and the perithecium not made up of a single circle, the substance is much thicker and denser, and its filamentous structure more obscure. Indeed, had it not been for the discovery of the present species, I should have still regarded the filaments as rejected from the perithecium, though with a degree of uncertainty about the matter, such as is intimated in my observation on the species in the English Flora. It is to be observed, that the structure of either is scarcely to be ascertained with accuracy, except from fresh specimens. S. blepharistoma at present has occurred only on Agaricus adustus; S. subulatum is found on various Agarics and Boleti. A question may be raised whether fungi so constructed belong properly to the division Pyrenomycetes; as the texture of the species before us, at least, is not strictly speaking vesiculoso-floccose. When, however, the uterine character is taken into account, and the visible advance toward the

more normal structure so immediate in S. subulatum, I think there can be no reasonable doubt about it. Were, however, the filaments but free to the base in S. blepharistoma, and by consequence the mass of sporidia collected in a globule at their centre, we should have a fungus belonging to the Coniomycetes, and indeed only specifically distinct from Psilonia rosea and hyacinthorum, Berk. Whether the structure in other species of Sphæronema is at all the same, I have no means of ascertaining, as I have never met with any in a recent state.

Perithecia scarcely exceeding half a line in height, often much more minute, transparent, of a very pale yellow, varying greatly in form, but in general more or less inflated at the base, occasionally conico-subulate, often confluent, mostly furnished with a long distinct slender neck, the orifice of which is fringed with a single row of distinct filaments, which are indeed the apices of those of which the perithecium is composed. Sporidia oblong, obtuse or subtruncate, much larger than in Sp. subulatum, flowing out and forming about an elongated subpersistent pale-yellow globule.

Tab. XV. Fig. 4. *a.* portion of gill of Ag. adustus, with S. blepharistoma, nat. size; *b.* do magnified; *c.* single perithecium; *d.* orifice and sporidia; *e.* orifice and sporidia of S. subulatum, all highly magnified.

* 58. *Phacidium coronatum*, Fr. Obs. i. p. 167.—This species has been often figured, but I cannot find anywhere an accurate analysis. The figures of Ditmar and Dr Greville are both defective from two low a magnifier having been used. Dr Greville, indeed, only indicates the presence of paraphyses, and figures a very few minute elliptic sporidia in the asci. In Ditmar's figure the paraphyses are distinctly drawn, and the sporidia are more numerous. The latter even under a low power is the more correct; with a magnifying power a little superior, the sporidia appear to be distributed in short lines, and the paraphyses flexuous; but when highly magnified the granules are found to be sporidiola, arranged six or seven together in linear sporidia, and the paraphyses curled round at the tips, like the apices of the filaments in Helicosporium, but not as in that genus septate. It is probable that a still higher power might show septa between the sporidiola. I find the structure precisely the same, whether the plant is produced on beech or oak leaves, and in specimens that have been dried for the herbarium.

Tab. XV. Fig. 5. *a.* asci and paraphyses of Phacidium coronatum; *b.* sporidium, both highly magnified.

II.—*The Natural History of the British Entomostraca.* By William Baird, Surgeon, H. C. S. Plate XVI. (Continued from p. 333.)

In my last paper (No. 4 of Magazine of Zoology and Botany) I gave a monograph of all the British species of *Cyclops*, that I have been able as yet to discover in the fresh water and sea shores of this country, without, however, pretending to have made the list complete.* I shall now proceed to take notice of two other genera, the history of which is also replete with interest,—the genera *Cypris* and *Cythere*.

In Latreille's arrangement they form the 2d group of his section *Lophyropa*, the *Ostracoda*. In M. Edwards' work they will form the 1st order of his Legion *Entomostraces*, the *Ostrapodes*. M. Straus, previous to M. Edwards, had removed these two genera from the *Branchiopodes*, and formed them into a distinct order by themselves, which he has also named *Ostrapodes*. As we may have some remarks to make upon the systematic arrangement of the insects belonging to the *Entomostraca* at the close of these papers, we shall defer till then giving the reasons why the genera *Cypris* and *Cythere* should be removed from the *Branchiopodes*, and in the meantime, in accordance with what I have already stated upon this subject in my former paper, I shall follow Latreille's arrangement with them as well as with the *Cyclops*.

Order, BRANCHIOPODA,—Section, LOPHYROPA,
Group, OSTRACODA,—Genus, I. CYPRIS, II. CYTHERE.
1st Genus, CYPRIS.

Bibliographical History.—Baker is said to be the first author who has taken any notice of this genus. In his work "Employment for the Microscope," published in 1753, an anonymous correspondent describes at some length an insect which has a bivalve shell, somewhat resembling a small fresh-water muscle, and gives a figure of it lying on its back, which is barely sufficient to enable us to discover that it is a *Cypris*. Straus complains that he cannot discover any mention made of the genus by Baker, either in the edition of 1743, or 1744, which are the only editions he has been able to see; neither is there, he says, any plate 15 in either of these editions. He quotes the wrong work, however, having referred to the "Microscope made easy," instead of Baker's second work "Employment for the Microscope," in which he would have found the insect referred to by Muller. Linnæus in his Fauna Suecica, 1746, describes a species in a few general terms; and in the 7th edition of his Systema Naturæ, 1748, he mentions a species under the name of Monoculus concha pedata, but gives no description. In the 10th edition of the same work, edited by Langius, 1760, he gives the description as taken from the Fauna Suecica, but names it *Monoculus conchaceus*. Joblot, in his "Observations d'Histoire Naturelle faites avec le Microscope" 1754, describes a species which he calls *poisson nommé Detouche*, or *grain de millet*, from its resemblance in size and colour to that species of seed, and gives a figure of it. Ledermuller, in his work on the microscope, "Mikroskopischer Gemüths und augenergotzung, &c." 1760, gives several figures of a species of Cypris, and says he has frequently seen them in copulation. Poda, in his "Insecta Musæi Græcensis," 1761, gives one species, the *Monoc. conchaceus* of Linnæus, quoting merely his description. Geoffroy, in his "Histoire des Insectes," 1762, after a few general remarks upon the Monoculi, describes shortly two species of this genus, but gives no figures of them. Muller, in his "Fauna Insectorum Fridrichsdalina," 1764, only mentions one species, under the name and description given by Linnæus in his "Fauna Suecica," but in 1771 he published an admirable paper in the "Philosophical Transactions," attributed by M. Straus to Mr Bennet; but only communicated to the Royal Society through him, in which he gives an excellent account of two species in particular, with many details of their anatomy and habits, and concludes by giving a list of nine species which he had at that time discovered; he includes them all, however, under the name of Monoculus. In his "Zoologiæ Danicæ prodromus," 1776, he first established the genus *Cypris*, as well as the other genera of his Entomostraca, all of which till then had been constantly described under the general name of Monoculus. Fabricius in his "Systema Entomologiæ" 1775, gives the species which Linnæus had already described, the *Monoc. conchaceus*; and De Geer, in his "Memoires pour servir à l'Histoire des Insectes," 1778, describes one or two species, though he calls them only varieties of the same, and gives a few details concerning them. In 1785 appeared the "Entomostraca" of Muller, with copious details and descriptions, and pretty accurate figures of all the species already shortly described by him in his "Zoolog. Dan. prodrom." and at the end of his paper in the Philosoph. Trans., which paper is also reprinted in French, at the commencement of this excellent work. Till the time that Muller undertook the working out of the species of this genus, our knowledge of them was scanty indeed. The descriptions found in the authors I have already quoted previous to him, were so superficial, that even when illustrated by figures, which are also generally very bad, there was no possibility of distinguishing what species they meant to describe. This difficulty may be readily seen upon inspecting the synonymes given by Muller, and then referring to the authors quoted by him, when we can easily observe that he himself has made several mistakes in such references, neither the description nor figures of such agreeing with his. For instance, under the species *pubera*, he refers to the *M. conchaceus* of Linnæus, with the description which that author gives in his Fauna Suecica, "antennis capillaceis, multiplicibus, testa bivalvi,"—a description so very general, that it answers equally well to any or all of his eleven species. He also refers to Joblot for the same species, but from the figure which that author gives, as well as from his description, it appears to me, that it much more nearly resembles Muller's *Candida*, and the reference to De Geer is equally faulty, as it is evident that figure 5 and figures 6, 7 of that author, *both* of which are quoted by Muller as the *pubera*, are in reality *two* distinct species! In determining the species, therefore, we must consider the researches of the various authors previous to Muller as of little or no use whatever. Indeed after Muller's time the various authors who have taken notice of this genus of insects have done little else but copy him, till the appearance of Straus's paper and the work of Jurine. For instance, Gmelin in the 13th edition of the "Systema Naturæ," 1788, not only quoted Muller's species, but gives his faulty references also; and Manuel, in his article "Monocli," in the "Encyclopedie Methodique, Histoire Naturelle, Vol. 7th," 1792, after a few general details, copies the same species as Gmelin gives; while Fabricius in his "Entomologia Systematica," 1793, gives the 11 species which Muller gives, retaining in addition to this, Gmelin's erroneous quotations. Bosc, in his "Histoire Naturelle des Crustacés faisant suite à l'edition de Buffon, publié par Deterville," 1802, gives a great many interesting details of this genus; as does also Latreille in his "Histoire Naturelle Genérale et Particulière des Crustacées et Insectes, faisant suite à l'edition de Buffon, publié par Sonnini," 1802; but he only mentions Muller's species. Ramdohr in 1805 published his little work on the Monoculi,* in which he gives some very excellent details concerning the anatomy of the Cypris, accompanied by some very good figures, but his work does not seem to have been known to almost any of the succeeding naturalists who have written upon this genus; he only describes the *Cypris strigata* of Muller. M. Daudebart de Ferussac, fils, in a memoir published in the "Annales du Museum d'Histoire Naturelle, Tom. 7th," 1806, describes a new species; and M. Risso, in his "Histoire Naturelle des Crustacés des Environs de Nice," 1816, describes two additional ones; but though these additions were made to the number of known species, and although Latreille, in Cuvier's "Règne Animal," 1817, and Lamarck, in his "Hist. Nat. des Animaux sans Vertèbres," 1818, give a variety of details concerning the genus generally, little real knowledge concerning the anatomy of the inhabitants of the tiny shells was conveyed to us, as Ramdohr's work seems to have attracted no attention, till M. Straus published his admirable paper on the genus Cypris in the 7th Vol. of the "Memoires du Museum d'Histoire Naturelle," 1821, containing a most elaborate anatomical description of the genus, with a notice and figures of three new species not described by Muller. About the same period as Straus read his paper before the Academy, appeared Jurine's splendid work on the Monoculi, containing many very interesting details of this genus generally, with beautiful figures of 18 species; but both of these authors appear to have been ignorant of the previous work of Ramdohr, as we find no reference made by either of them to his excellent little work, though published fifteen years prior to theirs. Desmarest in his "Considerations Generales sur les Crustacés," 1825, although he gives a very good account of the different genera, taken chiefly from Straus and Jurine, with a description of 21 species, takes no notice of Ramdohr; though M. Latreille, in the last edition of the "Règne Animal," 1829, notices his memoir with all due approbation, and has contributed much to make his labours more generally known. We know of no original memoir upon this genus having been published in this country,—though in "Rees' Cyclopedia," under the Art. Monoculus, we have the species described as given by Fabricius; and in Leach's article Crustacea in the "Edinburgh Encyclopedia," we have no details, and only two or three species taken notice of.

---

* Dr Macculloch, in his work on the Highlands and Islands of Scotland, says—he has added 33 new species!

---

* Beytrage zur Naturgeschicte einigen deutschen Monoculus arten.

ANATOMY.—Muller, Ramdohr, Jurine and Straus, all differ in many respects in describing the anatomy of the genus Cypris, both as regards the nomenclature and the use of the parts described by them. In minuteness of detail and accuracy of description and figures, the memoir of Straus, however, stands pre-eminent amongst those of his fellow-labourers, and though in the following remarks we shall take all advantage of the memoirs of the other three authors, we shall follow M. Straus more particularly, in his nomenclature and descriptions. The body of the animal is completely inclosed within a horny shell of two valves, which in general appearance resembles very considerably that of the mussel,—so much so, that, as Muller says, a person at first sight of the insect, would suppose that it was a parasite inhabiting the shell of some small mollusque. The substance of these valves is compact and very brittle, and they seem to be endued externally with a species of varnish, to protect them from the action of the water, as, whenever they rise to the surface, the shell becomes perfectly dry and floats there in spite of the animal's struggles to again immerse itself. The valves are open in their whole circumference, except in the middle third of the dorsal surface, where they are united by a ligamentous hinge and muscles, by which the animal can open and shut the shell at pleasure. About the middle of each valve, in most species, are to be seen a number of small lucid spots, the use of which I do not know. Muller has taken notice of them in the *pubera*, and asks, " an ovula ?" but there is no connection between them and the ova. No other author has taken notice of them; they are to be met with in perhaps all the species.

The body of the insect (Plate XVI. Fig. 1,) is composed of two rounded lobes of unequal size, connected together by a narrow space, and having on their upper surface a transparent body, which is the matrix according to Jurine. From the anterior lobe of the body (Fig. 1, *a*,) spring the two antennæ, immediately above which is situate the eye; the anterior or first pair of feet; the organs of the mouth, and the second pair of feet. From the posterior lobe, (Fig. 1. *b*) spring the third pair of feet and the tail. Eye (Fig. 1. *c*) single, fixed, in the form of a black sessile tubercle, in which we can discover no traces of crystallines. Antennæ (Fig. 1, *d*. Fig. 2,) two, inserted immediately below the eye, and rising near each other. In general they consist of seven articulations,* from the three or four terminating ones of which arise several pretty long filaments, varying in number in the different species. In the larger species we see these filaments to be beautifully plumose, a circumstance which has never been pointed out by any of the various authors who have written upon this genus. Whenever the animal moves, it invariably puts these organs into rapid motion, dilating and bringing together again the long filaments which spring from near their extremity, and waving them to and fro with great rapidity. They are thus said by Muller and Straus to act as true fins, and to be the principal organs of

* Jurine says 8.

progressive motion which the insect possesses; and no doubt the plumose nature of the filaments assists materially their power, though Jurine says that, from their position in the anterior part of the body, and from their motions being thus confined by the opening of the shell, they cannot be considered as acting the part of true fins; and that their use in progressive motion is much inferior to that of the anterior pair of feet. Latreille thinks these filaments may also act as respiratory organs as well as the branchial plates of the jaw. There is very considerable discrepancy amongst the four authors I have above mentioned, as to the number of feet. Muller and Ramdohr say there are only four; the former remarking upon the singularity of an insect quadruped. Straus enumerates six, while Jurine says there are eight. Muller was not aware of the organs which Straus calls the third pair of feet; Ramdohr was, but considers them as connected with the male organs of generation, while Jurine says that they are organs arising from the matrix, the use of which he does not understand. In addition to the first and second pairs, of Muller, Ramdohr, and Straus, Jurine considers the organs which Muller calls "barbillons" attached to the mouth, (the palpi of the mandibles of Straus) and the branchial plate of the upper jaw, as two additional pairs of feet. In describing these parts of the body, I shall follow Straus's nomenclature, as appearing to me the simplest and best, and certainly the most accurate; the figure which Jurine gives of them not being at all correct. Feet, then, are six in number, or three pairs. The first or anterior pair (Fig. 1. *c. c.* Fig. 2.) are inserted immediately beneath the antennæ, are the strongest of all, and consist of five articulations.* The penultimate one, or "jambe" of Straus, gives origin near to its base to several pretty long filaments, varying in number and length in different species; and like those of the antennæ, in the larger species, are seen to be beautifully plumose, a fact not taken notice of by any author, and the last articulation, the tarsus of Straus, is terminated by three pretty strong hooks. This pair of feet therefore, by this organization, is fitted for both swimming and walking; the long plumose filaments of the fore leg answering the same purpose, and being applied to the same use as those of the antennæ, causing these feet when put in motion to act also as fins, while the hooks at the termination of the tarsus enable it to seize hold of the plants, &c. amongst which they live, and thus walk from place to place. These feet are considered by Jurine as more deserving the name of fins than the antennæ are, but yet he does not mention the long filaments which they possess, and by which their action, as fins, is principally produced. They are considered by Latreille as acting, along with the antennæ, as respiratory organs. The second pair of feet (Fig. 1. *f.* Fig. 4,) are not so strong as the first pair, and are composed of five articulations also, the last of which is terminated by one strong curved hook. The first pair are directed backwards; the second are directed forwards; they want the long filaments which the first pair possess, and are thus only used for walking with. The third pair (Fig. 1. *g.* Fig. 5,) arise immediately behind the second pair, and consist of four articulations;* the last of which is terminated by two short hooks, and has a filament thrown back from its extremity, like a spur. They are curved upwards and backwards, and are always contained within the shell, never being extruded. Their use, according to Straus, is to support the ovaries. Jurine considers them as somehow connected with the matrix, but says he is ignorant of their use; the figure which he gives of them is very incorrect. Mouth.—The mouth is situate in the inferior surface of the anterior lobe of the body, and consists of a lip, a kind of sternum,† performing the functions of an inferior lip; a pair of palpiferous mandibles, and two pairs of jaws. The lip, (Fig. 6, *a.*,) says Straus, is composed of a great scaly piece like a hood, forming a projection which advances between the two anterior feet, and is fixed to the body by four long apophyses. The sternum, or lower lip, (Fig. 6. *b.*) according to the same author, is elongated, triangular, and moveable, articulates with the lip, and has at its extremity two curved apophyses to articulate it with second pair of jaws. The mandible (Fig. 7. *g.* Fig. 1. *h,*) is very large, and is formed of two pieces. The larger, or mandible, properly so called, (Fig. 7. *a,*) is terminated at superior extremity by a point, and at the lower or incisive extremity by five pretty strong teeth. The other piece is in the form of a regular palpus, (Fig. 7, *b.*) which issues from about the middle length of the proper mandible, and consists of three joints, provided with several setæ, the first of which joints has, near its base, a very small branchial plate, (Fig. 7 *c,*) terminated by five digitations. This palpus is the second pair of feet of Jurine, the "barbillon," of Muller, the use of which, both agree, is to cause a current of water towards the mouth, carrying with it the particles destined for the insect's food. The first pair of jaws (Fig. 1. *i.* Fig. 8,) have for their base a large square-shaped plate, (Fig. 8. *a,*) furnished at anterior extremity with four fingers, the superior of which is of two joints, the other three of only one, but all terminated by several long hairs. From the external edge of this plate, forming the base, arises a large elongated branchial plate, (Fig. 8. *b*,) which gives off from the superior crescentic shaped edge, a row of nineteen long spines, arranged like the teeth of a comb. The square plate with its fingers must be Jurine's third pair of feet, though if so, the figure which this author gives of these organs, as well as of his second pair of feet, (the palpi of the mandible, of Straus,) is decidedly incorrect. He seems to have been ignorant of the existence of the branchial plate, as he asks, "if it be true that the branchiæ be the first character in the crustacea, where shall we place them in these monoculi? in the antennæ, feet, or tail? we cannot give a preference to any one of these parts over another."*—The second pair of jaws (Fig. 9) are much smaller, and are articulated on the posterior angle of sternum by means of the two curved apophyses at its extremity. Each jaw consists of two flattened joints, the latter of which has several stiff hairs at extremity, and on external edge gives off a rounded finger, which Straus says, he thinks, must be considered as a palpus. The posterior portion of the body is terminated by a long tail, (Fig. 1. *k*. Fig. 10,) consisting of two lengthened stalks, each terminated by two short curved stylets, with a third implanted on upper edge, a little above them. This tail is free, and possesses much freedom of motion, the insect extruding it from the shell at pleasure. One great use of it seems to be to clean the interior part of the shell, which its length and mobility fit it well for; but Straus says also that its use is perhaps to serve for depositing the eggs. The anatomy of the internal parts of the body is more difficult to make out distinctly. The alimentary canal, according to Straus, consists of a short narrow œsophagus, a large oblong stomach, occupying the whole of the dorsal region of the body; and a simple intestine nearly as large as the stomach, becoming narrower towards the posterior extremity, and opening by an anus between the two stylets which form the tail. The ovaries are two large simple, conical vessels, placed externally upon the posterior portion of the body, and open one at the side of the other into the anterior part of extremity of abdomen, where they communicate with the canal formed by the tail. There is another organ, the use of which is not so well ascertained. It is a large and conical mass, situated above the articulation of the mandibles, of a granulated structure apparently, and of a light colour. Straus says that as he could not see exactly its termination, he is ignorant of its use, but he supposes that it must be either the salivary glands, or the testicles. The heart and nervous system have as yet escaped observation.

---

* Jurine says eight.

---

* Straus says five.

† Straus.

---

* Histoire des Monocles, &c.

Habits, Manners, &c.—The insects of this genus are inhabitants solely of the fresh water, and are to be found in almost every pond and ditch where the water remains stagnant, but not putrid. They are not so prolific as the *Cyclopes*, but in some of the larger species we can count, according to Jurine, as many as 24 eggs. The males have never yet been discovered; and the act of copulation has never been witnessed by any author, with the exception of Ledermuller, who says he has seen them in the act, and gives a representation of them in that state. I have frequently witnessed two individuals in much the same situation as those figured by Ledermuller; but it did not appear to me that at the time they were engaged in copulation; and as neither Muller, De Geer, Jurine, nor Straus, have ever witnessed them in the act, Ledermuller must in all probability have mistaken the nature of their junction. Straus says, that every specimen he has examined has been laden with eggs, which makes him ask—"Are they hermaphrodites? or do the males only appear at some particular season of the year?" Jurine has collected eggs immediately after they had been deposited by the parent insect; has isolated them, and seen them safely hatched. He has then isolated the young ones after they were hatched, and found that they became pregnant without intervention of males. They must either, therefore, be hermaphrodites, or, as in some other genera, as the *Daphniæ* for instance, one copulation suffices not only to impregnate the female for life, but the succeeding generations also. As the males of the *Daphniæ* appear only at particular seasons of the year, and in small numbers, it is probable that the males of the *Cypris* will be found also by succeeding observers. The eggs are perfectly spherical, (Plate XVI. Fig. 11,) and are deposited by the insect upon some solid body, such as part of some plant, &c., in a mass, sometimes, says Straus, uniting some hundreds from different individuals; the mother fixing them to the surface of the body on which they are deposited, by means of some glutinous substance, and then leaving them. When the animal is about to lay, it fixes itself, says Jurine, so firmly in some secure place, that it cannot be displaced by any agitation of the water, and is occupied about twelve hours in the operation. The eggs remain about four days and a-half before they are hatched, and then the young at once assume the appearance of the perfect insect, though varying a little in the shape of the shell (Fig. 12). According to Jurine they undergo several moultings before they are fit to procreate their species—the frequency of these moultings depending upon the season of the year, and being in proportion to the gradual development of the insect. Moulting continues to take place in the adult after each laying—and as the shells of these little animals become very frequently perfectly covered with dirt and moss, which adhere close to them, this change of covering becomes a useful act to disembarrass the insect of a shell become disagreeable to it; while, in the young, their development can only take place by getting rid of the shell as soon as it becomes too small for the body contained within. This renewing of the shell forms a fine example of the process of exuviation, as naturalists call it—the change which takes place being most complete, for not only does the shell itself fall off, but the insect casts off even the external parts of the body, the fine pectiniform branchiæ and minutest hairs clothing the setæ of the antennæ, &c.

The food of these little insects consists of dead animal matter and confervæ, &c. Straus says, he never saw them attack living animals when these were well and strong, but he has frequently seen them attack worms, &c. when wounded and weak. Though dead animal-matter is their choice, they will not, he adds, eat it when putrid. They, no doubt, also prey on each other, as I have frequently seen individuals of one species devouring eagerly the dead carcasses of a species different from themselves.

When the ponds and ditches in which they live dry up in summer, they bury themselves in the mud, and thus preserve their lives as long as the mud retains any moisture—becoming active as ever when the rain falls and again overflows their habitations. After long continued droughts, however, when the mud becomes very dry and hard, they perish; but, as Straus observes, the eggs will not perish along with the parents, but will be hatched four or five days after being placed in water. I have given, in my paper on the *Cyclops*, the result of Jurine's experiments upon the power these insects have of resisting drought; but, though it appears from what is there stated that they will not stand drying quite, yet I have no doubt, from what I have observed in summer, that the *Cyclops* can prolong their existence also by plunging themselves in the mud—for, when examining ponds which had been filled again by the rain, after remaining two months dry, I have found numerous specimens of the *C. quadricornis* in all stages of growth.

These little creatures seem to be very lively in their native element, being almost constantly in motion, either swimming about pretty rapidly by the united action of their antennæ and anterior feet, or walking upon the plants and other solid bodies floating in the water. Instead of being, like the molluscous animals to which they bear such a resemblance in external covering, fixed to one place, and condemned to live amidst eternal darkness, they, says Muller, "by opening their valves, enjoy light, and move at their will—sometimes burying themselves in the mud, sometimes darting through the water, the humid air of their sphere. If they meet any unforseen object they conceal themselves all at once in their shells, and shut the valves, so that force and address seek in vain to open them."*

Species.

Sp. I.—*Cypris pubera*—Plate XVI. Fig. 1–13. **Testa ovata reniformis, strigis viridibus obliquis; tomentosa.**

Habitat.—Found in Berwickshire: neighbourhood of London, &c.; common.

Synonimes, &c.—*Baker*, Employment for Microscope, p. 387, plate 15, fig. 8? 1753.

Sordid insect. *Muller*, Philosoph. Transact. Vol. lxi. p. 230, tab. 7, fig. 4-7. 1771.

Cypris pubera, *Do.* Zoolog. Danic. prodromus, p. 198, No. 2382, 1776.

Monoculus ovato-conchaceus, *De Geer*, Memoires pour servir, &c. V. vii. p. 476, pl. 29, fig. 6-7, 1778.

Cypris pubera, *Muller*, Entomostraca, p. 56, tab. v. fig. 1—5, 1785.

Monoc. Conchaceus, *Linn.* Syst. Natur. cura Gmelin, 3003, No. 7, 1788.

Mon. Conchaceus, *Manuel*, Encyclopedie Methodique, Hist. Nat. Tom. vii. p. 727, No. 39, pl. 266, fig. 27-30, 1792.

Mon. Conchaceus, *Fabricius*, Entomolog. Systemat. Tom. ii. p. 496, 1793.

Cypris Conchacea, *Latreille*, Hist. Nat. Gen. et Part. des Crust. et Ins. Tom. iv. p, 246, 1802.

Cypris Conchacea, *Lamarck*, Hist Nat. des Anim. sans Verteb. Vol. v. p. 124, No. 1, 1818.

Mon. Conchaceus, *Rees'* Cyclopedia, Art. Monoculus, 1819.

Cypris Conchacea, *Leach*, Edinburgh Encyclopedia, Art. Crustacea, Vol. vii. p. 388.

Monoc. puber, *Jurine*, Hist. des Monocles, &c. p. 171, pl. 18, fig. 1—2, 1820.

Cypris pubera, *Desmarest*, Consid. Gen. des Crust. p. 383, 1825.

Cypris tristriata, *Baird*, Transact. Berwickshire Nat. Club. p. 99, pl. iii. fig. 13, 1835.

There appears to me considerable obscurity amongst authors with regard to this species. Muller's description agrees very well in most respects, but his figure is decidedly bad. The figure given by Jurine is so different from that given by Muller or his description of it, that they do not appear to be the same species. Misled by the figure which Muller gives, I made it a new species in the Transactions of the Berwickshire Naturalists' Club, under the name of *C. tristriata*, having quoted the young as the *pubera*. The quotations and synonimes of both Muller and Jurine are at variance with each other, and many in both authors are, I think, injudicious and incorrect.

---

* Entomostraca.

The shell is of an oval shape, and reniform, valves convex, of a green colour, more or less deep; anterior portion of shell of a deep green, immediately behind which is a portion of a lighter colour; posterior part of shell of a less deep green than anterior, and through it run obliquely, from near upper and middle part of shell, two and sometimes three narrow bands of a deeper colour than any other part of shell. In some specimens, generally the largest, the shell is of nearly a black colour, from the dirt which adheres to the valves obscuring the marks which distinguish the species, and making it appear almost like a different one. Nearly in the centre of each valve are to be seen a congeries of about seven small lucid spots. The whole shell is densely hairy; antennæ of about fourteen filaments, beautifully plumose; filaments of anterior feet about six, also finely pennated.

Sp. II.—*Cypris detecta.*—Testa reniformis, pellucida, plana.

Habitat. Berwickshire and Roxburghshire: neighbourhood of London, &c.

Synonimes, &c. Ledermuller; Mikroskopischen Gemüths und augenergotzung, p. 140, tab. 73, 1760.

Smooth white insect, *Muller*, Philos. Trans. Vol. lxi. p. 230, tab. 7, fig. 1—3, 1771.

Cypris detecta, *Do.* Zoolog. Dan. prodrom. p. 199, No. 2386, 1776.

Cypris detecta, *Do.* Entomostraca, p. 49, tab. iii. fig. 1—3, 1785.

Monoc. detectus, *Gmelin*, Syst. Natur. 3001, No. 36, 1788.

Mon. detectus, *Manuel*, Encyc. Method. Hist. Nat. Tome vii. p. 725, No. 30, pl. 266, fig. 15–17, 1792.

Monoc. Conchaceus, *Fabricius*, Entomol. Systemat. Tom. ii. p. 495, 1793.

Cypris detecta, *Latreille*, Hist. Nat. Gen. et Part. des Crustaces, &c. Tom. iv. p. 241, 1802.

Monoc. detectus, *Rees'* Cyclopedia, Art. Monoculus, 1819.

Monoc. Conchaceus, *Jurine*, Hist. des Monocles, &c. p. 171, tab. 17, fig. 7–8, 1821.

Cypris Conchacea, *Desmarest*, Consid. Gen. sur les Crust. p. 383, 1825.

Jurine quotes as synonimes of this species, but unadvisedly in my opinion, the *Mon. Conchaceus* of Linnæus' Fauna Suecica, the description of which, I have already said, would answer any other species as well—the *Mon. à coquille longue* of Geoffroy, and the *Mon. ovato-conchaceus* of De Geer. The first of these two last is also quoted by Muller, as synonimous with his *C. pubera*, and the latter bears very little resemblance in figure to that which he gives himself.

The shell is of an oblong shape, the valves flatter than in most of the other species, and on lower margin sinuated or kidney-shaped. Its colour is of a dull white, without any peculiar spots, or markings; it is pellucid, smooth, and free from hairs.

(To be continued.)

ART. III.—*Contributions to British Ichthyology.* By R. PARNELL, M. D.

ON the coast of Devon are to be found all the Gurnards that are mentioned by Mr Yarrell, in his excellent work on the British Fishes, *Trigla cuculus*, *T. hirundo*, *T. lineata*, *T. lyra*, *T. gurnardus*, and *T. Blochii*, and I have the pleasure of adding another to the list, *Trigla lucerna*, of Brunner, which is so little known, as to have been omitted by British writers. It is interesting to mention, that Rondeletius was the first who figured this fish. He obtained it from the Mediterranean. Brunner afterwards received a specimen from Marseilles, and named it *Trigla lucerna*. Risso also makes mention of one being taken at Nice, and Cuvier, who obtained specimens from Naples, has given a good figure of it in his Histoire Naturelle des Poissons, pl. 72.

1. TRIGLA LUCERNA.

It is astonishing how this fish could have escaped the notice of British naturalists, as it is by no means rare. It possesses such strong specific marks of distinction, that it has been known to some of the fishermen at Brixham, for the last thirty years, by the name of "Long-finned Captain," and is esteemed the sweetest and the most delicate of the British species; but, owing to its small size, it is scarcely ever brought on shore, being returned again to its native element as unfit for the markets. In September last, while engaged in the pursuit of natural history, I saw, taken at one haul of a trawl-net, seven of these fish, scarcely one of which could be considered perfect, having the intervening membrane of the rays more or less destroyed.

Description.—The largest specimen that I have observed measures 10½ inches in length, and 1¼ in depth. The head, back, the two dorsal, and the caudal fins, are of a rose red, while the under part, together with the ventral and anal fins, are of a dirty white, more or less shaded with red. The pectoral fins are of a deep blue colour, particularly on the inner surface. The first dorsal fin commences in a vertical line over the base of the pectorals, and terminates at the origin of the second dorsal, which runs down the back to within 1¼ inch of the base of the tail. The anal fin commences under the second ray of the last dorsal, and ends at a little behind the termination of the same fin. The pectorals are rather large, a little longer than the ventrals, and reaching as far as the second ray of the anal. The first ray of the anterior dorsal fin is spinous, about 1⅓ inch in length, not half the length of the second, which is setaceous as well as the third. The fourth ray is spinous, as well as the remainder of the rays of that fin. The anterior rays of the second dorsal fin are longer than the terminating ones; the tail is lunated, with each extremity of equal length.

The numbers of the fin rays are:

1st D. 9; 2d D. 17; P. 12; and 3 free; A. 18; C. 9; V. 6.

The head is one-fifth the length of the whole fish. On each side, a little below the lateral line, is a broad light metallic band, extending from the operculum to the base of the tail. The lateral line is smooth, broad, and slightly elevated, composed of a series of semicircular plates, beautifully radiated at their free border. The dorsal ridge is formed of twenty-four sharp serrated plates, extending from the first to the last dorsal ray. The scapular spines are very short. The eyes moderate; two spines situated at the upper and anterior margin of each orbit. The snout slightly dentated and rather blunt at its extremity. Body smooth; scales oval and entire; the air-bladder is bilobed, with the coats remarkably thick and opaque. In none of the specimens could I find any appearance of roe.

This fish can be readily distinguished from every other species of the same genus yet known, by the form and arrangement of the lateral plates, and by the elongated second ray of the first dorsal fin, which, when folded down, reaches beyond the sixth ray of the second dorsal fin.

2. MONOCHIRUS MINUTUS.

This species of Sole is undoubtedly an addition to our British Fauna, and seems unknown to Cuvier, Brunner, Bloch, Risso, or to any other author whom I have consulted; but how far it is new to science remains to be determined by future research. Perhaps I may have been misled by the laconic style of these writers on Ichthyology; but I will endeavour, by more ample description, to remove it in future beyond the reach of doubt. From the numbers of these fishes which are taken in the trawl-nets off Brixham throughout the whole year, and from their never appearing to attain a large size, there can be little doubt but that they are arrived at their full growth, from which circumstance I have proposed the specific name of "*minutus*." The fishermen, who appear perfectly familiar with their appearance, call them red soles, and scarcely a trawl boat leaves Brixham harbour that does not capture a dozen or more of these fish daily; but, from their diminutive size, they are either thrown overboard, or left to decay at the bottom of the vessels.

Generic character.—Pectoral fin on the eye side very small, that on the opposite side rudimentary. (Monochirus, Cuvier.)

Specific character.—Every sixth or seventh ray of the dorsal and anal fin, black.

Description.—Length 5 inches; the width at the upper third nearly 2 inches; the colour of the back light reddish brown, the under surface pale white. In shape it is similar to the common sole (*Solea vulgaris*) but of a more wedge-shaped form, becoming narrower at the caudal extremity. The head is small, one-sixth of the whole length; the mouth is twisted, the angle of which reaches as far as under the middle of the left eye. Each jaw is furnished with a number of minute teeth placed close together, and extending but half-way round the mouth; the eyes are small, the left one a little in advance. The dorsal fin commences immediately over the upper lip and runs down the back, to be connected with the caudal rays; the anal fin begins under the posterior margin of the operculum, and continues within a short interval of the tail. The numbers of the fin rays are:

D. 73; P. 4; V. 4; A. 54; C. 14.

The scales are small, with from twelve to fifteen denticles at their free extremity, rendering the whole surface of the fish rough to the touch, when the finger is passed from the tail to the head. The pectoral fin on the eye side is small with the lower half black, while the fin on the opposite side is very minute, and of a pale white; the lateral line is straight throughout; the tail is rounded at the end, and mottled with brown.

The only fish the present one seems likely to be confounded with is the Monochirus lingula, or red-backed sole; but they will be found to differ widely from one another. In the red-backed sole there is a distinct interval between the dorsal and caudal fins; the tail is margined with white; the anal and dorsal fins are marked with six or seven blackish spots, which extend beyond the base of the rays, towards the body of the fish; and its shape is of an oblong form. None of these characters apply to the Monochirus minutus.

(*To be continued.*)

IV.—*Miscellanea Zoologica.* By GEORGE JOHNSTON, M.D., Fellow of the Royal College of Surgeons of Edinburgh. Plates XVII. XVIII. (Continued from p. 382.)

II.—A DESCRIPTION OF SOME PLANARIAN WORMS.

Class ENTOZOA, *Rudolphi.*—VERMES, *Lamarck.*
Order STERELMINTHA, *Owen.*—V. MOLLES, *Lamarck.*
Family Planulariæ, *Lamarck.*
Genus Nemertes,* *Johnston.*

CHARACTER.—*Body linear-elongate, contractile, somewhat compressed, soft, even and continuous: anterior extremity mostly with several ocelliform points, and two occipital approximate spots marking the position of a double centre of circulation: mouth a simple terminal pore: anus terminal.*

OBS.—The worms which I include in this genus are of a linear form and very contractile, so that when extended in the act of moving through the water or mud, they exceed their length when at rest by three, four, or more measures. They are soft and glutinous, but with more firmness of structure than their appearance indicates; and to the naked eye they are perfectly smooth, exhibiting no trace of articulations or wrinkles, though when contracted and viewed through a magnifier, we find that the margins are minutely crenulate. The anterior extremity is usually marked by several black specks arranged on each side of it, variable in number according to the species, and which are considered by Muller and others as organs of vision. We are not able, with our small microscope, to discover any peculiar organization in them, yet there is reason, (notwithstanding the objection of Lamarck, founded on the want of optic nerves and a nervous system, †) to assent in this opinion, from the exact resemblance of these points to the eyes of the annelidans,* and from the very obvious manner in which the worms evince their sensibility to the impressions of light. The species have no other visible exterior organs: they move in an even continuous manner by undulations, frequently imperceptible, propagated along the body, which they often throw into knots and strictures, or extenuate to that degree, that the ordinary breadth shall be more than four times its diameter when in this state of extension.

---

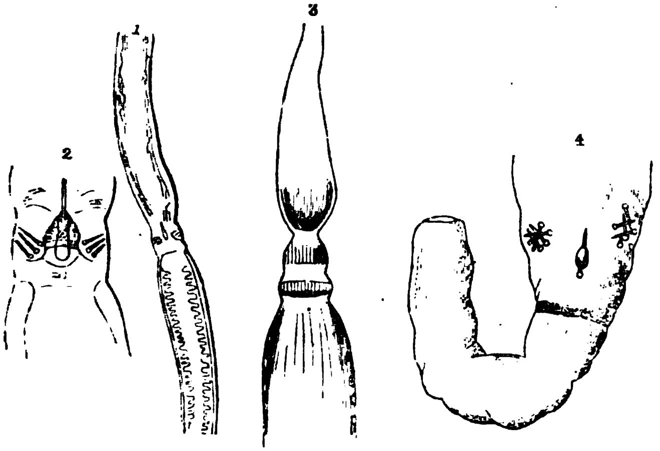
* Nemertes—one of the Nereides.—The genus so named by Cuvier (Reg. Anim. iii. p. 259,) for the reception of the sea Long-worm of Borlase, had been previously named *Lineus* by Sowerby; and Cuvier's name being thus unnecessary, I have thought myself warranted in taking it as the designation of some worms nearly allied to Lineus, but which are certainly generically distinct.

† Hist. Nat. des Anim. s. Vert. iii. p. 177.

The internal structure is most easily seen when the worm is slightly pressed between plates of glass, and placed under the microscope. It is more beautiful and complex than the plainness and simplicity of the exterior would lead us to believe, nor indeed can I unravel or describe it with the accuracy that is desirable. The mouth is difficult to be detected, and its position and form are generally indistinct, but sometimes it becomes evident enough, and in other cases, its exact place is often shown by a slight sinus or emargination in the anterior extremity in which it is placed: it is a simple circular pore without any hard parts. (Plate XVIII. Fig. 5, *m.*) From it an intestine descends down the centre of the body, in a straight or undulating line, according to accidental circumstances of position, to the opposite extremity, where it opens outwardly by a pore similar to the mouth, and equally simple. The intestine (Pl. XVII. Fig. *5 i. i.*) is a cylindrical tube of a firmish texture, and of nearly equal calibre throughout, though subject to partial and temporary constrictions and dilatations, and, as just remarked, its course can be made straight or tortuous at the will of the animal, evidently to accommodate it to the length of the body in its extreme variations, for being apparently of a much less contractile tissue than the body itself, the intestine is doubled in sinuous folds when the worm contracts and shortens, but when this draws itself out in a long line, the intestine becomes a straight canal, with something of the character and office of a vertebral column. In tracing the intestine from the mouth downwards, the structure appears to be homogeneous, and alike throughout in the species placed in the second section of the genus, but in the true Nemertes, we meet with some remarkable peculiarities towards the middle of its course. First, we perceive on each side a small circular spot or cavity, in each of which are three spines (Fig. 1, 2, 4,) with their sharp points directed outwards; beneath these there is a cup-shaped organ (Fig. 3,) encircled above with a faintly plaited

---

* See Muller "sur les yeux problématiques des Annelides," in the Annales des Sciences Nat. xxii. p. 19; and Grant's Outlines of Comparative Anatomy, p. 252–3.



membrane, and armed in the centre with a strong spine, which can be compared to nothing more aptly than to a cobler's awl in miniature, the part representing the handle being very dark, and the point transparent and crystalline, (Fig. 2, 4.) This apparatus is placed within the intestine, is visible only when this is compressed, and is, as I believe, stomachical, having some distant analogy with the proper digestive organs of the Laplysia and Bulla; and in confirmation of this view it may be remarked, that the œsophageal part of the intestine appears to be simple, while the inferior portion exhibits a plaited structure internally, (Fig. 1, 3.) In our Pl. XVII. Fig. 5, this part is represented as being suddenly narrowed, and after descending a little it bends and ascends for some way, when it is again deflected and ends abruptly in the body; and such undoubtedly were the appearances in the specimen from which the drawing was made, and in others which I have examined; but such a disposition of parts is rather uncommon, the usual course being for the intestine to descend tortuously to the anus. I believe that in the contrary instances, the natural adhesions of the alimentary tube have been ruptured by the compression to which the body had been subjected, and that by its contractions, the intestine was then forced into this unnatural position, for that the intestine terminates and opens at the posterior extremity is certain, the contents having repeatedly been seen to be evacuated there through a small pore. While examining specimens, a large portion of the intestine will occasionally be seen rolling itself from the mouth, like a very long proboscis, until perhaps fully one half of the tube is evolved,—a fact which I also attribute to the compression of the plates of glass, for I have never observed the worm naturally to evolve a proboscis, though every pains may be taken to force it to do so, by irritations, by keeping it in sea water until it corrupts, by immersion in fresh water, or in spirits.*

The intestine lies loose in a distinct abdominal cavity (Pl. XVII. Fig. 5, and Pl. XVIII. Fig. 1,) or canal excavated through the centre of the body. This canal seems to contain besides a grumous fluid, which may frequently be observed moving rapidly up and down in irregular currents dependent on the contractions of the worm or intestine, and not at all analogous to the currents within the tubes of zoophytes. It is fringed along each side with a close series of vesicles or cells formed, in the true Nemertes, apparently by the folds of a membrane, while in the sub-genus Borlasia, they are separate, and as it were excavated in the parenchyma of the body, (Pl. XVIII.) The resemblance between this structure and what have been called *cœcal appendages* in some allied worms is obvious, † though not very exact, for they are not produced from, nor in organic connection with the alimentary canal, as is manifest from their remaining unaffected during the motions of the latter, which moreover may be removed entirely from the body without bringing with it, or tearing away, the presumed cœca. These are always full of some opaque matter in the Nemertes, and some observations lead me to believe, that it varies in intensity at least according to the nature of the animal's food, whence I conclude they belong chiefly to the digestive system; while the ova appear to be developed in their interstices, and in the space between them and the skin, (Pl. XVII. Fig. 2.) But in Borlasia the cœca are more distinctly vesicular and isolated, and although the depth of colour of their contents varies also, yet they are usually clearer and paler than the surrounding parenchyma, or as it were empty, and I have plainly seen in them, not often, indeed, oviform bodies, which again have not been detected in the interstices, (Pl. XVIII. Fig. 3.) We seem, then, to have combined in them a duplicity of function,—they are both nutrient and uterine cells,—but how far this view can be admitted, I must leave to the determination of some better observer.[*]

---

* In some cognate species, Otho Fabricius observed the intestine to be extruded when no compression was used, but still under circumstances easily reconcileable with our explanation. "De orificio antico infero tubulum pallidum *in agone mortis* exserit:" *i. e.* Planaria rubra, Faun. Grœnl. p. 324; also p. 325.

† Compare our figures of this structure with that of the *Diplozoon paradoxum* of Nordmann in Ann. des Sciences Nat. V. xxx. p. 382, pl. 20. This figure, on a reduced scale, is copied into the Cyclop. of Anat. and Physiology, i. p. 654, fig. 328; and into Kirby's Bridgewater Treatise, pl. 1. B. fig. 4. The comparison may be usefully extended to the *Annelides*, Cyclop. of Anat. and Phy. i. p. 169, fig. 70; Roget, Bridgew. Treat. ii. p. 103, fig. 260; and to the *Tæniæ*, Ibid. ii. p. 83, fig. 247.

Many specimens, and several species, had been examined before a trace of a nervous system could be detected, and I was ready to conclude that these worms were truly acritous, when I was prevented falling into this error by the discovery of it in the Nemertes octoculata. In this species the nervous system is distinct, and I have been able since to see it in several others more obscurely. It consists of a single oblong or ovate ganglion laid over and above the œsophagus posterior to the heart; and from this ganglion nervous threads radiate in every direction, which are unbranched, of nearly equal sizes, and soon lost in the body. (Pl. XVIII. Fig. 2.) The system has obviously a nearer relation to that of some of the lower Molluscans than to any of the typical annelidans, a fact which, however, is not anomalous, for Mr Owen has made the same remark in reference to some intestinal worms.[†]

The circulating system appears to be complete, though very simple. Immediately behind the eyes there may be observed a roundish spot on each side of a reddish colour, indicating the position and figure of organs which are perhaps the centres of this system. These organs are connected by a cross vessel; and from their inferior aspects a fine vessel departs which, running along each side between the intestine and skin, encircle the body with a continuous canal of equal calibre in every portion of its long circuit. (Pl. XVII. Fig. 5.) It is uncertain whether these side-vessels are connected by smaller transverse inosculations: I believe they are, and that the pale lines which we observe to cross the body in some species, at short and regular intervals, are produced by these vessels of communication. (Pl. XVII. Fig. 1.) On examining Fig. 5. another vessel will be seen winding down the middle, along the surface of the alimentary canal, in an undulating line. That it has any connection with the centre of circulation or lateral vessels I cannot affirm, for I could neither trace its origin, nor its place of termination, nor can I perceive that any vessel goes from it, but we may be allowed to infer, from its analogy with the Planariæ,* that it belongs to the circulating, and not to a nervous system. I have never detected the slightest appearance of a fluid in motion in any of the vessels; and were I to call the central vessel an aorta, and to decide that the lateral vessels were for the purpose of returning the refluent fluid to the heart, I might justly be censured for indulging in a fancy which has no observation in its support. We are too liable to assign to the organs of these lower creatures the names of what we deem their analogues in higher classes, and with the name to associate an idea of sameness or identity in their functions,—a propensity which has not seldom led to error.

---

[*] Since this was written, farther observations have almost satisfied me that the apparent differences in the formation of the cœca in these subgenera are dependent, in a great measure, on the state of the worm in regard to repletion,—the distinct vesicle-like spaces being formed by the extension and coalescence of the cœca around a space filled with ova, which would seem therefore to be always exterior to the cœca.

[†] Proceedings of the Zool. Soc. of London, pt. iii. p. 28; and Trans. of the Zoological Society, i. p. 328–9.

The Nemertes live under stones and in mud between tide marks: they avoid the light, and love obscurity. They are numerous in individuals, but how they are propagated is yet conjectural. At certain seasons I have seen within the body small roundish oviform grains lying unconnected with any particular viscus, but of the real nature of these, no observation has enabled me to form an opinion. Specimens have also occurred in which there seemed to be a beginning separation of the body into two or more parts, but these marks of division might be the effect of injury. The species are very tenacious of life: if cut into several pieces, each lives and moves, and perhaps in time each will grow up to a complete and perfect worm. When placed in fresh water they shew, by instant contortions, how painful and poisonous is this fluid to them. They soon break into pieces, disgorge portions of the viscera, and speedily die and dissolve into a soft jelly.

* *A gizzard near the centre of the alimentary canal, armed with spines.*—Subgenus NEMERTES.

1. *N. gracilis*, of a uniform olive-colour, very long and filiform; eyes numerous. (Plate XVII. Fig. 1.)

HAB. Under stones near low water-mark. Berwick Bay.

This worm, when drawn out to its ordinary length, as in the act of creeping, measures about 20 inches, while it is not more than a line in breadth: body linear or somewhat attenuated at the posterior extremity, compressed, smooth, soft and glutinous, very contractile, of a uniform olive-green colour, lighter on the ventral surface; when viewed through a common magnifier it is seen to be marked with numerous pale cross lines, and the sides appear lighter than the centre: head obtuse, rounded in front, tinted with yellow, and dotted with numerous eyes along each side reaching to the two orange-coloured spots, which are about one-eighth of an inch from the extremity.

---

* See figures illustrative of this in Roget's Bridgew. Treat. ii. p. 250, fig. 346; and in Cyclop. of Anat. and Physiology, i. p. 653, fig. 327.

2. *N. lactiflorea*, of a uniform cream-colour, often dusky down the middle, linear-compressed; eyes many. (Plate XVII. Fig. 2.)

Planaria lactiflorea, *Johnston*, in Zool. Journ. iii. 489.

Hab. Under stones between tide-marks—common in Berwick Bay.

Body linear, vermiform, about three inches long when extended, but very contractile and polymorphous, smooth, of a uniform cream-colour in general, sometimes flesh-red, often dusky down the centre from the opaque contents of the intestine, marked with two red spots near the head, anterior to which are the ocelliform specks arranged on the sides in two more or less perfectly separate clusters: the eyes are unequal in size, and about 12 in number on each side: mouth subterminal: anus terminal.——When compressed, or otherwise irritated, this species has been repeatedly noticed to exude a milky fluid from its whole surface.

There is what I consider to be a variety of this species of a reddish orange-colour, with dusky undulations down the middle from the interranea. (Plate XVII. Fig 3,) It is comparatively rare, and the depth of its colour may proceed from some difference in food, or in its state of repletion. The resemblance between it and the *Planaria rosea* of Muller (Zool. Dan. tab. 64. fig. 1, 2,) is sufficiently great to suggest a suspicion of their identity, but Muller expressly states that the latter is destitute of eyes. (See the Prod. Zool. Dan. p. 221.)

3. *N. quadrioculata*, of a yellow colour tinted with green; narrow, elongate: eyes 4, remote. (Pl. XVII. Fig. 4.)

Planaria quadrioculata, *Johnston*, in Zool. Journ. iv. 56.

Hab. Sea shore under stones, rare. Berwick Bay.

Body 1½ inch long, soft, flattened, contractile, narrowed towards the tail, of a yellowish maculated colour, with a dirty greenish intestinal line down the middle; mouth rounded; eyes 4, placed in a square form and rather distant.—The maculated appearance proceeds from white oviform bodies.

4. *N. melanocephala*, yellow or yellowish-green, linear-elongate; head with a dark transverse spot, and 4 eyes. (Plate XVII. Fig. 5.)

Hab. Between tide marks. Berwick Bay, not common.

Body from I to 1½ inch long, narrow and vermiform, tapered at the tail, of an olive or yellowish colour, the latter tint most predominant in front, which is marked with a black spot of a quadrangular form, and 4 eyes placed nearly in a square. It was in this species that the structure peculiar to the genus was most easily to be traced.

5. *N. pulchra*, linear-elliptical; of a flesh-red colour, with a series of scarlet spots along each side, or of a uniform aurora-red; eyes numerous, unequal. Plate XVII. Fig. 6.

HAB. Amongst corallines, and in old shells, &c., in deep water. Coast of Berwickshire, frequent.

Body about an inch in length, and two lines in breadth, compressed, narrow, elliptical, the front marked with numerous black specks, irregularly arranged and visible with the naked eye. Many specimens are of a uniform aurora-red colour, considerably paler on the ventral aspect, while others are beautifully marked along each side with a series of large scarlet spots; the former are perhaps males, or more probably individuals in a barren condition, while the others seem to be full of mature ova, for an examination of the spots through the microscope shows that they are produced by clusters of oviform bodies lying in the interstices of the cœcal appendages.

This and the first species contrast remarkably in their form, and show the extremes to which this character is subject. The structure of the stomach is like that of its congeners, excepting in there being five or six spines on each side of it, instead of three, which is the usual number. Immediately under the hearts, we observe a large, somewhat muscular viscus, apparently hollow, and lying in the course of the intestine, but apparently unconnected with it, for in the individual which served for our figure, the intestine had been extruded from the body, and entirely expelled by the contortions of the worm produced by impure sea-water. Of its office and nature I can offer no opinion, but I may remark that in all the species a greater duskiness in its site shows that a similar organ exists in all.

* * *Alimentary canal apparently homogeneous throughout.* Subgenus, BORLASIA [*]

6. *N. olivacea*, of a dark olive colour; eyes four, placed in a square. Plate XVIII. Fig. 1.

---

[*] A name given by Oken to the *Lineus* of Sowerby, co-equal therefore with the *Nemertes* of Cuvier, equally unnecessary, and as originally applied altogether inadmissible. Because it commemorates a worthy naturalist, Dr William Borlase, author of the History of Cornwall, I rejoice in being able to affix it to a group hitherto uncharacterized.

Planaria bioculata, *Johnston*, in Zool. Journ. iv. 56.

Hab. Between tide-marks. Berwick Bay.

Of a dusky olive colour, often tinted with purple in front, and paler at the posterior extremity, which is more acuminated than is common in the genus: body linear and narrow, from three to six inches long, a line or so in breadth; smooth and compressed: anterior extremity rounded, obscurely marked with a red spot over the site of the heart. In the Zoological Journal, I have described this species as having only two eyes, but as this appears to be a mistake, or at least not constant in the species, it has become necessary to alter its designation.

When pressing a portion of the body between the plates of glass, I have occasionally seen some bodies escape, of a curved fusiform shape, acute at both ends, and marked towards one of them with a pale circular spot. Plate XVIII. Fig. 1. They have shown no signs of life, nor can I say what they are, though it has occurred to me, that they may be embryo-young; and that the worms may in fact be ovo-viviparous.

7. *N. octoculata*, of a uniform light reddish-brown colour; eyes 6 or 8, placed in opposite pairs on the sides of the head. Plate XVIII. Fig. 2.

Planaria octoculata, *Johnston*, in Zool. Journ. iv. 56.

Hab. Under stones, between tide-marks. Berwick Bay.

Body linear, narrowed posteriorly, 3 inches long, and about ⅛th of an inch broad, compresed, of a light reddish-brown colour, with a darker spot in front over the hearts: eyes 6 or 8, and in some specimens I have seen 7, three on one side, and four on the other. It appears therefore, that the number of the eyes, on which Muller and others have reckoned confidently as a good and invariable character, is not to be implicitly relied on.

8. *N. purparea*, of a uniform purplish-red colour, paler underneath; eyes 6–8. (Plate XVIII. Fig. 3.)

Hab. The sea shore under stones. Berwick Bay.

Worm 2 or 3 inches long, smooth and glutinous. From the darkness of its colour, the spot indicating the position of the heart is scarcely visible until the body has been compressed. The number of eyes is the same as the preceding, and liable to the same variety. In this species the ova were distinctly seen to be contained within the cœcal vesicles, which, when compressed, assumed a pyriform shape, having the slender end toward the intestines.

9. *N. rufifrons*, of a yellowish colour verging on rose-red anteriorly; mouth dark red; eyes none; body very slender. (Pl. XVIII. Fig. 5.)

Hab. Under stones between tide-marks, in Berwick Bay, frequent.

When fully stretched out in creeping, this worm is fully two inches long, but very narrow and filiform, or rather tapering to a point posteriorly; it is of a yellowish colour for the greater part, but the anterior extremity is a rose-red, while the apex or mouth forms a dark red speck. When slightly compressed between plates of glass the intestine may frequently be seen unrolling itself from the circular and terminal mouth in the manner that some annelidans unroll their proboscis. The worm will thus sometimes nearly disembowel itself. The intestine is white, round and filiform, without any appendage.

Explanation of Plates.

Plate XVII. Fig. 1, Nemertes gracilis of the natural size. 1.* Anterior portion of the same magnified; Fig. 2, 2, N. lactiflorea, both figures of the natural size. 2.* Anterior portion magnified. 2** Caudal extremity magnified, shewing the ova exterior to the cœca; Fig. 3, N. lactiflorea, var. brunnea. 3.* The head magnified; Fig. 4, N. quadrioculata, natural size; Fig. 5, N. melanocephala, natural size. 5.* The same magnified; Fig. 6, N. pulchra, natural size. 6.* The head of the same magnified.

Plate XVIII. Fig. 1, 1, 1, Nemertes (B.) olivacea, of the natural size. 1.* The anterior and middle part magnified. 1** Embryo young? of the same contained in the body of some specimens. Fig. 2, Nemertes (B.) octoculata, natural size. 2.* The anterior portion magnified; Fig. 3, Nemertes (B.) purpurea, natural size. 3.* The head, and a portion of the middle, and the tail magnified, shewing the ova within a kind of vesicle. Fig. 4, Nemertes (B.) rufifrons, natural size. Fig. 5, A portion of the anterior extremity magnified.

Of the wood-cut Figs. 1, 2, represent the stomach and a portion of the intestine of Nemertes lactiflorea; 3, and 4, of the N. pulchra; 3, shewing it previous to being compressed, 4, after being compressed between plates of glass.

V.—*Notes regarding the distinctive habits of the Scotch Phocæ or Seals.* By JAMES WILSON, F. R. S. E., &c.

THE genus PHOCA of Linnæus, comprising a large amount and a considerable diversity of species, has like other great natural groups been separated into several minor genera by modern naturalists. The teeth differ considerably both in their form and position, and when accurately ascertained and distinctly described, will no doubt aid the systematic observer in his arrangement of the species. All agree in having five toes to both extremities. Those of the fore paws usually diminish in size from the innermost or thumb, to the outermost or little finger, while on the hind feet the lateral toes are the largest, and the others diminish towards the centre. The form of the head, especially in the smaller species, usually bears resemblance to that of a dog,—while in their natural cunning and intelligence, and in their capability of being tamed and instructed, they exhibit a still farther likeness to that sagacious creature. They prey chiefly on fish, and are extremely destructive to salmon and other gregarious species, along our shores, in estuaries, and at the mouths of rivers. They seldom, however, ascend the fresh waters to any considerable distance from the sea,—for the alleged occurrence of seals in remote Siberian rivers and the inland waters of Lake Baikal, is a fact which requires confirmation.*

Although extensively distributed over the waters of the ocean, it is in high latitudes (whether northern or southern) that seals occur in greatest abundance,—such as inhabit tropical regions being, as it were, insulated from their kind, and occurring in less numerous assemblages. The species are so vaguely described by voyagers, and have been even as yet so indifferently characterized by naturalists, that their geographical boundaries are by no means well defined; but we may rest assured that those authors are in error who describe our northern kinds as occurring equally among Antarctic icebergs. All other animals have limits which they do not pass, and seals are doubtless subjected to a corresponding restriction. For example, the gigantic species called the sea elephant (*Phoca proboscidea*, Desm.) is never found in the northern hemisphere, while such of the smaller southern species as have been examined, are found to differ from those of corresponding size, which are native to the European shores. Peron is of opinion that the *Phocidæ*, in reference to their natural location, form three great geographical groups, of which two are northern (Atlantic and Pacific,) and one southern, and that the species of each of these regions are peculiar to itself. He inclines to apply the same principle to the cetaceous tribes,—but in neither case has he sufficiently considered the numerous species which occur in temperate and equatorial regions. A proper exposition of the species of the Mediterranean and the Euxine, and their comparison, on the one hand, with those of the north, and, on the other, with such as are known to occur in the enclosed waters of the Caspian, the Red Sea, the Persian Gulf, the Indian Ocean, and the frozen waters of the extreme south, would prove to be subjects both of interest and utility. It is indeed singular that animals so important in the scale of creation, whether we regard their great economic value to mankind, their position in the system of nature, or their peculiar organization and singular habits of life, should hitherto have attracted so superficial a notice on the part of naturalists.*

---

* See Krachenninikow's *Voyage en Sibirie et au Kamtschatka*, T. ii. p. 421.

Any critical observations regarding the inadequate manner in which the numerous foreign species have been distinguished, would come with a bad grace from one, who, having it in his power to study the habits and ascertain the distinctive attributes of the few which frequent our island shores, has yet failed to effect that discrimination. Something, however, is occasionally gained by calling attention to the fact of our being comparatively ignorant of what might be ascertained by many, without much exertion, and therefore, while confessing that I have not yet studied the structure of our native kinds, and am still unqualified to assign their distinctive characteristics, I make no apology for offering the following brief notes regarding their natural habits.

Our western islands are supposed to be frequented by three different species of seal, although only two are usually recognized by systematic writers. † All of these have been repeatedly observed by my principal informant.‡

The largest of these is at least double the dimensions of either of the other two. It is known by the native name of *Tapvaist*, and although it associates occasionally with the other kinds, yet it differs in many respects in its habits. I presume it to be the species usually designated by our British writers as the Great Seal, or *Phoca barbata*. It occurs occasionally along our eastern shores,§ and, from the great size of a seal shot some years ago, near Stonehaven, by the late Lord Cassilis, I infer it to have been a *Tapvaist*. It spreads, however, far and wide along the icy arctic shores.

---

* *Encyclopædia Britannica*, 7th edition, Vol. xiv. p. 123.

† See note at the conclusion of this article.

‡ Mr Archibald M'Neill (of Colonsay.)

§ Is frequent on the Fern Islands.—Ed.

Our second species in point of size is by much the most common, and is known among the inhabitants of our western isles by the name of *Raun* or seal. I presume it to be the *Phoca vitulina* of naturalists, our common seal,—of which, in spite of its frequency, the distinctive characters and *synonymy* are still but vaguely ascertained.

Our third species is of considerably smaller size, and is known to the natives by the appellation of *Bodach* or old man. Though not so rare as that first alluded to, it is by no means common. I am not aware that any specific appellation has been bestowed upon it by naturalists, nor do I know that it has yet been described *secundum artem*, or even entered in any of the scientific catalogues.

I have already stated that the *Tapvaist* or great seal is observed occasionally on shore with individuals of other kinds; but notwithstanding this it may be characterized as being of solitary habits, and as frequenting the most remote and undisturbed situations. It is neither so lively nor so watchful as the common seal, nor is it so easily alarmed. It resembles that species in its general colouring, but may at once be distinguished from it by its enormous size. One of the most characteristic and distinctive traits in its history is derived from its period of production, viz. the end of September or commencement of October,—while that of the common seal is usually the beginning of June. In the young also, of these two species, there is a notable difference. That of the *Tapvaist* when whelped, if I may use the expression, is covered with white hair, greatly resembling the short coarse coating of a goat. This covering continues for many weeks, but is at length cast, like the nestling plumage of a bird, and the creature then assumes much the same livery as the young of the common seal, the prevailing hue of which is somewhat darker than that of the adults of either kind.

The young of the *Tapvaist* or great seal, (I avoid using the term *Phoca barbata*, because I think our native writers have sometimes applied the names of continental authors, without due consideration, or a requisite comparison of characters,) is invariably whelped above water-mark, and, it is said, during spring tides. They remain in a helpless condition on the rocks, for several weeks, before they can swim, and during this time they cast most of their long hair. When one of these is discovered by our island sportsmen, they do not immediately approach it, for so strong is the sense of smell, on the part of the parents, that they would certainly take alarm on scenting human footsteps. The sportsman, therefore, conceals himself behind some point of rock within gun shot, and there awaits the onward flowing of the tide, with which the kind but cautious mother invariably returns to suckle her still helpless young. The rifle then achieves its deadly work.

The average weight of an individual of this species, judging relatively from its dimensions when compared with those of the common kind, is somewhere about thirty stone, or 420 pounds. They not unfrequently yield upwards of forty bottles of oil. They have become of late years very rare along the western shores.

The common seal (*Phoca vitulina,* I suppose,) is still to be seen in considerable numbers, but unlike the *Tapvaist* it generally frequents *Sounds,* and flats where fish abound, and where the water is not excessively deep. It is particularly fond of flounders; at least off the coast of Colonsay these fish appear to form its favourite food. This perhaps arises from their being ground fish, and therefore easily caught. Mr M'Neill informs me that he has frequently observed a seal rise to the surface with a flounder in its mouth, and dive again on finding itself unable to swallow its prey, in consequence of its peculiar breadth. When engaged in this attempt, so intent do they become, as entirely to forget their habitual wariness, and they may then be approached and shot with unusual ease. The kind now alluded to produces its young about the beginning of June, and in a very short time after the offspring is whelped it is taken to sea by the mother.

The fishing for the common seal commences in autumn, and is practised by means of nets stretched across narrow sounds between rocks where the seals are in use to swim. In these they entangle themselves, and are taken out either by boat, or in some cases where the net is left dry by the receding tide, by persons approaching them on foot. It is, however, the young ones only that are taken in this way, and even these only during a month or two in autumn.

Seals are fond of going frequently on shore,—for the most part during every tide. They are observed always to select the flattest and most shelving rocks, especially such as have been covered by water at full tide, and still more especially (I may say invariably)* those that are separated from the main land. They generally go ashore about the time of half ebb, and lie together so close as to appear to be almost in contact, to the number sometimes of one, two, or three dozen. With their heads constantly turned towards the sea, and seldom more than a yard or two from it, they seem to enjoy a pleasing repose on terra firma,—their appetites appeased by previous fishing, and a feeling of comfort or of satisfaction produced upon their moistened surface by the genial rays of an invigorating sun. But even in this their hour of rest their customary caution never leaves them, for one of their number is placed a little higher up the rock than the others, and he seems constantly awake, and ever and anon upraises his "grim feature," scenting the windward air. In the position first alluded to the main body frequently fall asleep with their heads I may say hanging towards the water. They generally prefer rocks of small dimensions, and as already mentioned, such as are periodically covered by water. This for two reasons; 1st, because, they are smoother, flatter, and *softer*, being covered with sea-weed; 2dly, because from their comparatively small size, they cannot be approached by human (or inhuman) foes, without observation.

---

* We have often approached seals on the rocks of the "main coast," between Aberlady and North Berwick on the Firth of Forth. One or two ledges of rock there, (ten or twelve years since,) were favourite resorts at low water.—Ed.

They generally remain on their rocky resting-places, unless disturbed, for nearly six hours,—that is, until the returning tide floats them off upon its buoyant waves. When on shore they frequently utter a grunting noise, not unlike that of a pig in a stye; but they never do so unless they feel perfectly secure. When severely wounded they are heard to express their pain by a peculiar moaning somewhat resembling the lowing of a cow. To what age the seal attains, or at what period it arrives at maturity, I cannot say, but the natives of the western isles suppose it to be long-lived. It not unfrequently attains to the weight of 16 stone, or 224 pounds. A specimen shot by Mr M'Neill, and not regarded as of large size, weighed 12 stone, or 168 pounds. This animal can remain under water nearly five minutes, and swims so rapidly, that during that period, if much alarmed, it will proceed nearly half-a mile. Though naturally of a timid nature, and always anxious to escape by flight, yet, when driven to extremity, a seal will show determined fight, and the immense power which he possesses in his jaw renders him a rather formidable foe. He moves with considerable force and celerity, at least for a short distance, even on shore; but the moment he reaches the water, and has it in his power to bend his body freely, it would be a vain endeavour, without an almost instantaneous mortal blow, to arrest his onward progress. He seems to receive some slight assistance during locomotion from his fore-paws, but I think none at all from his hind ones. The motion is mainly produced by a peculiar action of the body, somewhat like that of a fish, but rather up and down, than from side to side.

The common seal, though sagacious and extremely watchful, is also characterized by a considerable degree of curiosity, and its attention is obviously attracted by music. It is, however, too cunning to betray itself by any undue indulgence, and a good rifle is far more effectual than either flute or bag-pipe. If very much alarmed when on shore, seals will not return again to the same spot for weeks together, and if more continuously persecuted, they will desert a particular line of coast entirely. In former times, when many portions of our coasts were less frequented than at present, and these animals were much more numerous, they were in use to clamber to the tops of rocks above water-mark, and there fall asleep. On such occasions they were frequently surprised, and slain with bludgeons. This appears never to happen now,—a proof, among many others which might be adduced, that what we call the natural habits of animals are often regulated by artificial or accidental circumstances.

The third species to which I formerly alluded, is the *Bodach*, or *old man*. This is by much the least of all the seals indigenous to the British shores. Indeed, so small is it, that my correspondent for a long time entertained an idea (in opposition to the prevailing opinion of the natives,) that it was the young of the common kind. This view, however, he afterwards gave up, on seeing specimens not larger than an ordinary seal of three months,—but with grey beards and decayed teeth; and, moreover, when on shore on the same rock with the other seals, they do not lie near them, but a little way apart. They are also few in number, and Mr M'Neill does not happen to recollect having ever seen two of them together. They are not, however, at all so shy as the common seal, nor do they frequent such wild and desert stations as the *Tapvaist*. Our knowledge of this small species is, however, still extremely obscure, and there is no indication of its existence in any of our works on Natural History.*

---

* Since the preceding notes were placed in the hands of the editor, the 7th No. of Mr Bell's excellent "History of British Quadrupeds" has made its appearance. The British seals are there described as *four* in number, viz. the common species, *Ph. vitulina;* the harp seal, *Ph. Grœnlandica* of Muller; the great seal, *Ph. barbata;* and the long bodied seal of Parsons, *Halichœrus gryphus*, of more modern authors. The last named is referred to a separate genus, chiefly in consequence of the depth and oblique truncation of the muzzle, and the simple structure of the upper grinders. It appears to correspond with the identical specimen described by Parsons, which, from its great size, was often adduced in proof of the occurrence of *Ph. barbata* along the British shores; but, as Mr Bell has ascertained it to be *Hal. gryphus*, additional doubt is thus thrown on the said *Ph. barbata* as an indigenous kind. The point, however, will be easily determined, on the occurrence of any very large seal, by an examination of the teeth, and their comparison with the characters detailed by Mr Bell. I have now no doubt of the occurrence of *H. gryphus* among our *northern* islands; a cranium from Shetland, which I had sometime ago an opportunity to examine, corresponding in its simple upper molars with the dentition of that species. The chief points then for our Scotch naturalists to pay attention to, are, 1st, Whether our great seal is the *Ph. barbata* or *Hal. gryphus*: and 2dly, whether the small animal indicated in the preceding article is actually a distinct species. —J. W.

REVIEWS AND CRITICAL ANALYSIS.

I.—*Dr Lardner's Cabinet Cyclopædia. Natural History.* 1. *On the Geography and Classification of Animals.* By W. Swainson, Esq.—2. *Classification of Quadrupeds.* By W. Swainson, Esq. 12mo. London, Longman & Co. 1836.

In no department of science has a greater or more decided advance and improvement taken place than in that of Zoology. We speak more particularly of what has occurred in our own country, and, we may add, within our own recollection. This, we think, must be admitted and apparent to whoever looks with an unprejudiced eye at the imposing and lofty station it now occupies as a science, and the mode in which the investigation of it is conducted, as compared with its state some fifteen or twenty years ago, when languishing under the trammels of artificial system, and pursued on principles neither philosophic nor in consonance with nature. It is no longer,—Mr Swainson observes,—and we rejoice he thinks himself justified in making the observation, "It is no longer a study of names or of crude technicalities, but, like all other branches of physical science, is become the subject of philosophical investigation, and capable in all its details of similar proof, by inductive and analogical reasoning." For this improved state of our favourite science we are principally indebted,—and with pride we make the assertion,—to the labours and philosophic views of British naturalists; for though we are willing and anxious to give our due tribute of praise and grateful acknowledgments to Continental zoologists for their researches and discoveries, and are even inclined to believe that the "*Règne Animal*" of the illustrious Cuvier, although that work may have failed in its professed object, the classification of the various objects of the animal kingdom according to their organization, if it did not actually first give the proper direction to zoological investigation, at least essentially contributed to do so, still we assert that the discovery of the great principles or laws of the natural system originated with, and emanated from, a British naturalist." It is to the enlightened author of the philosophic pages of the "*Horæ Entomologicæ,*" that we owe the first announcement and demonstration of the circular disposition of affinities in natural groups, and of every such group being constituted of a certain or definite number. He also obtained the first perception of the theory of representation or symbolical resemblance, though he then supposed it partial, and was not aware of that universal application to which the researches of Mr Swainson shews it to be entitled; he also clearly pointed out the proper distinctions between relations of affinity and those of analogy, which had previously been confounded together, and proved what had only been hinted or glanced at by Lamarck, viz. that the series of affinities is not simple or linear, but of a complex and branching nature. These discoveries, of such importance to zoological science, and first promulgated in this masterly treatise, though rejected as innovations, or rather refused to be entertained by the bigoted adherents of artificial or nomenclatural system, were speedily embraced, to a greater or less extent, by several of the most eminent and rising naturalists of the day; and it was not long before the ornithological department of the science was subjected to the test of the M'Leayan theory. This was performed by Mr Vigors in his valuable essay upon the "Natural Affinities which connect the Orders and Families of Birds," in which the circular and quinary disposition of that class is ably and satisfactorily shewn to exist in its primary groups. But among the early followers and disciples of Mr M'Leay, no one entered the field of investigation with greater ardour, or has carried out his principles to such an extent, or so satisfactory a result, as the gifted author of the volumes now before us. Mr Swainson, we are of opinion, and in this opinion we are confirmed by the result of our own investigations, has, in the works he has already published, not only satisfactorily proved and substantiated the truth of the principles announced by Mr M'Leay, but has, moreover, discovered others of nearly equal importance, the result of analytical examination, supported and confirmed by the strict rules of inductive and analogical reasoning. After many years of incessant study, and the most searching investigation of the subject, with a reputation deservedly high, and which places him among the first zoologists of the age, he now appears before the public as the expositor of the true principles of zoological science, as the author, in fact, of a new *Règne Animal,* founded and arranged on the real affinities of the beings of which it is composed, and governed by certain laws of general and universal application. How far he is likely, eventually, to succeed in an undertaking so vast and comprehensive, we can only at present form a conjecture from the contents of the volumes already published. A careful perusal of these, assisted by our own studies, strongly incline us to think that signal success will crown his efforts; that he will succeed in establishing throughout the remainder of the animal kingdom, the same first principles of natural arrangement, which we are of opinion he has clearly shewn to exist in the chief departments of the Vertebrata; that he will rise from the completion of his task with an accession of fame to the high reputation he already enjoys, leaving to future zoologists a legacy of inestimable value, as teaching the true path towards the attainment of a perfect knowledge of the science. But even should he fail, or it were possible that the principles upon which the system is based, hereafter should be found incorrect or at variance with nature, still we hold that zoology must be benefited by Mr Swainson's labours; inasmuch, as an investigation as deep and extensive, and conducted upon principles equally philosophic, must necessarily be instituted and pursued before such an event could possibly be effected, no other mode of treating the subject can affect the conclusions at which he has arrived. We are aware that many, on a first or cursory perusal of these volumes, will be impressed with the idea, that the system is one involved in difficulties, and not to be mastered without great labour and deep study,—such we may expect to be the feeling of those who have but first commenced the study, as well as of all the adherents of artificial systems. We do acknowledge that the acquirement of the one is easier than that of the other, the artificial system requiring little mental exertion, beyond a power of discriminating differences and a memory for names; the natural, the full scope and employment of the intellectual and reasoning faculties; but who would not prefer the more difficult path to that of easier access, where the ultimate aim of the first so far surpasses that of the second, the artificial system, at best, being but an index to nature, the other explaining the laws and regulations which govern and guide her; the first teaches only the discrimination of a species, the latter stops not on this threshhold, but proceeds to shew the precise station such a species occupies in the scale of being, the affinities it possesses to others, and the analogies by which it is related and represented. We may also expect the law of representation, so prominently brought forward by Mr Swainson, will, from its mere novelty, meet with opposition, and be deemed fanciful, or at least carried to what may be considered, if not a ridiculous, at least an unwarrantable extent. Such an opinion, indeed, we have already heard broached more than once; but a theory substantiated by a long and painful course of investigation is not to be repudiated and condemned, unless it can be proved, by an examination as strict as that to which it has been subjected, that it is founded in error and unsupported by facts. We allow that many of the analogies or symbolical resemblances instanced by Mr Swainson, particularly when they relate to groups or individuals far removed, are, unless tested by analysis, often difficult to be recognized or perceived; but this is only what ought reasonably to be expected from the very nature of the subject, as such resemblances cannot be supposed so strong, or so easily perceptible in objects far removed from each other, as in propinquant groups. There are many who would at once allow and recognize an analogy between the eagle and the lion, who would yet dispute its existence in the case of the woodcock and the rat, (strikingly as it may be illustrated in the characteristic wood-cut at page 17, Vol. i. Birds), but it only requires an examination and analysis of intervening groups and forms to be as firmly persuaded of the correctness of the one as of the other. It is moreover a law, we think beautifully illustrative of the "wisdom of God as displayed in the Creation," and strongly corroborative of that unity of design which we can scarcely doubt prevails throughout all the works of the Creator, and which, in a late admirable treatise, is shown to have existed at least in Zoology, from the earliest epochs of the globe we now inhabit.

From what we have already said, our readers must be aware that we are followers of what is frequently termed the circular system, and believers in the principles or laws upon which it reposes. We have long been so, from a conviction that it is the natural system or true mode of investigating animal life,—a conviction, however, we must repeat, not merely drawn from or resting upon the writings and dicta of others, but the result of a long and patient examination of the subject. We therefore agree with Mr Swainson in the great principles he advocates, though we may occasionally differ or require further proof in regard to minute details. In addition to the profound and intimate knowledge of his subject, practical as well as theoretical, the author brings to his task the aid of a powerful and original mind, capable of the most extensive generalization, as well as of entering into minute and laborious detail. The arrangement of the volumes is, we think, upon the whole, good, and embraces every matter of importance connected with, or bearing upon, the subject; the style is free and copious, at the same time perspicuous and clear; and where the subject requires it, numerous and beautiful illustrations from the pencil of the author are introduced, by well executed wood-cuts, which will be of essential service to the student, in assisting him fully to comprehend what it is often difficult or almost impossible to convey by mere verbal description. In giving, however, our meed of praise to the enlightened author of a work, which must ultimately be of great importance in the pursuit and attainment of zoological science, we must not overlook or pass in silence what we consider to be failings, deserving at least of notice, if not of reproof; we allude to a *spirit of detraction*, or at least an unwillingness to do full justice to the merits of others, which we think is visible in many cases. That of the great and immortal Cuvier may be particularized as one, and an overweening opinion of self is so constantly brought forward and forced upon the notice of his readers, that, in our case at least, it proved a bar to the otherwise unmixt satisfaction and pleasure we should have felt in perusing these philosophic volumes.

We shall now proceed to examine these volumes in detail, giving, where we deem it requisite, our opinion of their contents, as they come under review.

The first part of the work relates to the Geography of Animals; a subject deeply interesting to the naturalist, and which we think the author has successfully treated,—his hypothesis being founded on philosophical principles, and, so far as we can ascertain, in accordance with facts. After a few apt introductory observations upon the varieties or races of Man, which he shows cannot be attributed to any of the secondary causes assigned or conjectured by those who have speculated upon the question, he next proceeds to show that the primary distribution of the animal world is involved in difficulties of a similar nature; the theories of the most eminent authors being all alike unsatisfactory and inconclusive; he therefore comes to the conclusion, that "the primary causes which have led to different regions of the earth being peopled by different races of animals, and the laws by which their dispersion is regulated, must be for ever hid from human research." This, however, does not debar an inquiry into what, he adds, "experience teaches is a fact," viz. that certain divisions of the earth are characterized by peculiar animals; these divisions, therefore, their boundaries, extent, and peculiarities, are the legitimate object of inquiry and investigation. Before announcing his own theory, he takes a review of those of Fabricius, Latreille, and Dr Pritchard, to all of which he shows there are many and insuperable objections, though he assigns, and we think deservedly, the merit of the nearest approach to a correct theory of animal distribution, due to the last named writer, as it is founded upon the Natural Geography of the Earth. His own hypothesis he prefaces with the following observations:—" Since, then, there is as marked a distinction between animals of the great Continents as there is between the races of mankind, by whom they are inhabited, it remains to be considered whether the general distribution of both are not in unison, whether their divine Creator has not, by certain laws incomprehensible to human understanding, regulated the distribution of man and animals upon the same plan? These questions lead us to the following propositions, 1. That the countries peopled by the five recorded varieties of the human species, are likewise inhabited by different races of animals, blending into each other at their confines. 2. That these regions are the true zoological divisions of the earth. 3. That this progression of animal forms is in unison with the first great law of natural arrangement, viz. the gradual amalgamation of the parts and the circularity of the whole." Assuming, therefore, in accordance with the most distinguished physiologists, that the typical or representative varieties of man are five, viz. the European or Caucasian ; 2. the Asiatic or Mongolian ; 3. the American ; 4. the Ethiopian or African ; 5. the Australian or Malay, the respective divisions of the earth inhabited by them will form the five zoological provinces." Their precise limits he does not pretend accurately to define, as an amalgamation or blending in of their contents must necessarily take place upon the confines of each, but the following he considers as a near approximation to the truth. " 1. the European or Caucasian range he supposes to include the whole of Europe, properly so called, with part of Asia Minor and the shores of the Mediterranean. 2. The Asiatic range, comprehending the whole of Asia east of the Ural Mountains. 3. The American range united to Europe and Asia at its northern limits; this region comprehends the whole of the New World, but into which it blends at the other extremity is not yet ascertained. 4. In this range he includes the whole of Africa south of the great desert; and the 5th or Australian province embraces the whole of Australia proper, together with New Guinea and the neighbouring islands, as well as those of the Pacific Ocean. The Arctic regions, it will be observed, in this distribution, are not considered as forming a zoological province, and properly so, as the genera and species restricted to them, or which are not found in the temperate parts of the other continents, are very few; he therefore contemplates them as the bond of union wherein the three great Faunas of Europe, Asia, and America meet, and are united together." In the five succeeding chapters he enters into a minute and detailed account of the zoological productions of each province, showing the peculiar forms by which they are characterized. This is carefully and ably executed, and indicates the comprehensive and intimate acquaintance the author possesses of his subject. At the end of each chapter, lists of the genera and subgenera of the animals and birds of each province are given, and numerous illustrations, beautifully drawn and executed, taken from the various departments of the science, bring forcibly before the reader the forms peculiar to and characteristic of each geographical division. In conclusion, he adds, "we consider that the facts now stated are sufficiently strong to establish the propositions with which this investigation was commenced. We have seen 1st, that animals are distributed upon a plan sufficiently obvious in its leading outlines to be comprehended and defined; and 2d, that this plan is found to harmonize in many remarkable ways, with that circular disposition, which is the first law of natural classification."

The rise and progress of Systematic Zoology occupies the second portion of the volume, the first chapter of which, after some preliminary observations upon the terms, system, and method, which, although by some considered as conveying a different signification, he shows must be taken as synonymous, is chiefly occupied in tracing the distinction between an artificial and a natural system, and the essential requisites which must belong to the latter. The whole of this chapter possesses great interest, and requires an attentive perusal. In the next an exposition of a few of the principal artificial systems is given, comprising those of Aristotle, Willughby, Linnæus, and Cuvier; of the two last as embracing the whole of the animal kingdom from the highest to the lowest groups, he enters into a detailed and minute examination, and, upon the whole, we consider his estimate of the merits of these systems correctly drawn, agreeing with him, that, as an artificial system, the Linnæan is best calculated, from the simplicity of its arrangement and the precision of its nomenclature, to effect the object it had in view, viz. the easy discrimination of a species without further reference to its station in the scale of being, or the analogies by which it is represented. We do not, however, think that ample justice has been done to the labours of Cuvier, for, though the *Règne Animal* has not proved to be a natural arrangement, and as an artificial one it may in some respects be inferior to that of Linnæus, still its comprehensive and philosophic views, we consider, gave that direction to the study of Zoology which paved the way to the discovery of those principles upon which the natural system is based. Of partial systems, or such as are confined to particular classes of animals, that of Temminck in ornithology is justly considered the best; his primary divisions, though forced and unnatural, and amounting to as many as sixteen in number, being clear, and therefore easily comprehended, and his genera, though few, well and carefully defined. The other ornithological systems noticed are those of Illiger, Vieillot, and Lesson, the peculiar features of which respectively come under the author's review. Of systems restricted to entomology, those of De Geer, Fabricius, Latreille, Clairville, and Leach, are particularly mentioned, and are accompanied by tables containing their divisions of the class. The chapter concludes with a few apposite observations on Binary or Dichotomous systems, which he shows to be not only among the most artificial of all arrangements, but as even incompetent to answer the purpose of a mere index to genera and species. From artificial, the author in the next chapter passes to the consideration of natural systems, or those "which endeavour to explain the multifarious relations which one object bears to another, not simply in their direct affinity, but in their more remote relations, whereby they typify or represent other objects totally distinct in structure and organization from themselves by certain general laws." After noticing Hermann's work, the *Tabula Affinitatum Animalium*, and *Lamarck's* System of the Soft or Molluscous Animals, in which that eminent naturalist caught a glimpse of the first great principle of natural arrangement, by discovering that the animal series was of a complex and branching nature, and not simple or linear, as had been previously supposed, he passes to the circular theory of Mr M'Leay, as developed in the *Horæ Entomologicæ* of that enlightened author, in which the fundamental principles of the natural system were first made public. Of this important treatise, the origin and foundation of a new and better school of Zoology, which is fast attaining a degree of perfection that could never have been acquired under any former system, he gives a detailed exposition, rendered the more necessary from the extreme rarity of the work in question, whose philosophic pages, few students can now hope to have an opportunity of consulting. This exposition he concludes with some important remarks, which, that they may not lose their effect, we give in the words of the author. "We have been induced to devote more space to the developement of the leading principles of this system, than we should otherwise have done, on many important accounts. *First,* Because it is unquestionably the first which clearly defined any one philosophic principle of classification, so that, strictly speaking, we must date the first partial developement of natural arrangement from the publication of the Horæ Entomologicæ. Lamarck, it is true, traced the outlines of the circle without knowing that he had done so; while Mr M'Leay, by a totally different process of investigation, arrived at the same general result, but with this difference;—that he discovered properties which belonged to this series of universal prevalence in natural groups, and he determined several of those laws which regulated the variation of animals; a process of induction which heretofore had never been dreamed of. These discoveries let in a flood of light on the study of nature, and converted that which had been a science of observation into one of the deepest philosophy."—The *Systema Mycologicum* of M. Fries is afterwards noticed, which is based upon the three great principles of natural classification announced a little previously by Mr M'Leay, but of which fact this eminent botanist was altogether ignorant when he made the same discoveries during his investigation of a group of the vegetable kingdom. The only point of difference between them is in the determinate number of their groups, those of M'Leay being five, while those of M. Fries are apparently four, we say only apparently, for they are in reality five, as he confesses that his *centrum* or typical group is always divisible into two series. Modifications which Mr M'Leay made in his system are afterwards noticed, as well as the views of other writers in regard to natural arrangement; and the chapter concludes with some general remarks which may, we hope, prevent in future any of those deviations from the true principles upon which the circular theory is established, and which can only tend to bring it into disrepute. Having taken a review of the various systems, artificial as well as natural, which have appeared, he proceeds, in the third part of the volume, to lay before his readers the result of his own researches on the first principles of the natural system, which are embodied in the following five propositions:—

1. That every natural series of beings, in its progress from a given point, either actually returns, or evinces a tendency to return again to that point, thereby forming a circle.

2. The primary circular divisions of every group are three actually, or five apparently.

3. The contents of such a circular group are symbolically (or analogically) represented by the contents of all other circles in the animal kingdom.

4. That these primary divisions of every group are characterized by definite peculiarities of form, structure, and economy, which, under diversified modifications, are uniform throughout the animal kingdom, and are therefore to be regarded as the *primary types of nature.*

5. That the different ranks or degrees of circular groups exhibited in the animal kingdom are nine in number, each being involved within the other.

These he proceeds to establish by interesting details, and which, so far as we have had an opportunity of examining, tend to substantiate their truth and universality as general laws. In regard to the first, it is almost unnecessary to say we have long considered it as fully established, not only by the arguments advanced by its discoverer, but by the subsequent severe analytical examination it has undergone. As to the second proposition, it is, we believe, likely to prove correct, being in accordance with the first division of natural bodies, animals, vegetables, and minerals, but we think a further investigation, particularly of the lower tribes of animals, is required, before it can be fully established as a general law. Should, however, the three divisions of the aberrant group be found invariably to form a circle of their own, then we must consider them only as one, though always divisible, or made up of three secondary circles, representing the Rasorial, Grallatorial, and Natatorial types; this law, however, of an actual trinary, instead of a quinary disposition, does not affect the natural series by which they are united; for, as Mr Swainson justly observes, "the discovery of the union of Mr M'Leay's three aberrant groups into a circle of their own is the addition only of a new property superadded to that which they were known to possess, this property consisting of uniting into a circle of themselves, as well as passing into the typical and subtypical groups." The third proposition, on the law of representation, which there is every reason to believe is of universal and not of partial application, is ably treated, and only requires to be further tested and investigated in the lower departments of zoology, to be admitted as another general law. In the succeeding chapter he enters into a detailed exposition of the fourth proposition, in which the primary types are pointed out. The fifth and last proposition is rested upon facts and observations, many of which are already satisfactorily proved, and before the public; and which show, that although all natural groups are circles, yet these circles are of different sizes, rank, and value, "therefore require particular names, that their comparative value may be understood, and that they may become efficient instruments of reasoning." He then adverts to and refutes the assertion that species are the only divisions in nature, as they are found as much and as intimately connected among themselves as genera. The ranks and gradations of circular groups are found to be nine in number, and their names, indicative of their relative value, are as follows: 1. Kingdom; 2. Subkingdom; 3. Class; 4. Order; 5. Tribe; 6. Family; 7. Subfamily; 8. Genus; 9. Subgenus, which is the lowest description of group yet discovered. For ourselves, we should have preferred the name *Genus* for the lowest group, giving that to which it is now applied another designation, say that of *Domus;* but as the term Subgenus has already received the sanction of the public, we cannot venture to urge any further alteration. In confirmation of the universality of these groups, examples of series from various departments of zoology are given, each of which it appears are the result of a strict analytical investigation by the author. Directions are afterwards given for the discrimination of species, in which he dwells upon the principal distinctions of form, sculpture, and colour; the mode of verifying a natural group is stated, by "ascertaining the circular series of its contents, the parallel relation of its parts to other groups, and the symbolical representation of the primary types of nature." This part of the subject he illustrates by the familiar example of the hedge-sparrow (*Accentor modularis,*) whose analogies and station are further exemplified by appropriate diagrams. The concluding portion of the volume professes to be a "familiar explanation of the first principles of practical and scientific zoology, with suggestions for a plan of studying the details of each department." Of this dissertation, particularly addressed to those who have first commenced, or are about to commence, the study of zoology, we may briefly remark, that it contains much valuable matter, and many excellent hints and suggestions, as to the qualifications required, and the course of study to be pursued, in order to gain that insight and knowledge of the system of nature requisite to entitle the student to the name of a *good naturalist,* in the proper and extended acceptation of the term.

We now enter upon the Natural History and Classification of Animals, which forms another volume of Dr Lardner's valuable Cyclopædia. As might be expected, the station of man in the creation, naturally engages the early attention of the author, and we are well pleased to find, as it is so completely in accordance with our own feelings, and the opinion we have long entertained, that he considers him as altogether out of the category. This he does, not only from arguments drawn from the nature of man considered as an intellectual and also a spiritual and immortal being, which shew that his natural affinities place him in a circle of higher intelligences, but from those deduced from analytical investigation and inductive reasoning, evidently proving the impossibility of placing him within the animal circle, even when viewed simply as a zoological form; the typical circles of the only groups into which he could possibly enter, supposing him to form a part of the animal world, viz. the *Quadrumana* of Cuvier, the *Primates* of Linnæus, being shewn in the analysis of that group to be complete and perfect without him. In conclusion he adds, " We have now shewn that, whether we regard man in his higher or his lower qualities—whether as an immortal or as a material being—the station that has been hitherto assigned to him in the scale of creation is inconsistent both with innate feeling, and with that logical induction upon which all true science reposes; nor is this the only inference to be drawn from the arguments here employed. Had the essential distinction, or, in technical language, the *specific character* of man not consisted in the immortality of his noblest part, there would have been an immeasurable hiatus between the circles of intelligent and unintelligent beings, which nothing that we can conceive would lessen, even by supplying the slenderest filament which might intimate their connection; nay more, the higher ranks of intelligence would appear to want that link which was to connect spirit with matter,—corruption with incorruption. If man holds a station in the series of unintelligent beings, he cannot enter into the circle of those that are intelligent, because no *being can occupy a station in two distinct circles.*"

The two kinds of organized matter, animal and vegetable, are next brought under consideration, and, strange as it may seem to those who have never directed their inquiries into subjects of this nature, it evidently appears, from the researches of the most eminent naturalists and physiologists, that all attempts rigorously to define either is impossible, as the union or amalgamation of the lower organized forms of each, has been satisfactorily proved. This, however, is only in accordance with what by naturalists is now considered almost in the light of an axiom, viz. that no abrupt or absolute divisions exist or can be detected in the great groups of nature. The definitions, therefore, that have been given of the distinctive characters of a vegetable and an animal, can only relate to the differences between the typical forms of each. "On this head," Mr Swainson observes, "we can add nothing to the definitions given by Linnæus, Cuvier, &c. or to the acute reasonings of Mr M'Leay, premising only, that the value of every character that can possibly be devised, will progressively be deteriorated, and finally lost, as we recede from the circle of vertebrated animals, and approach the confines of the vegetable kingdom." After giving a tabular view of the probable number of existing species of animals, which he calculates at near 600,000, an estimate we believe below, rather than above, the actual amount, he indulges in the following reflections, which are so appropriate, that we make no apology for quoting them at length. "It is then, with such vast hosts of diversified beings that the naturalist has to treat. These are his materials of study and contemplation, and these he is to examine, and, in some measure, to understand, before he can obtain a glimpse of the plan upon which they have been created. But, however overwhelming to the mind this number, viewed abstractedly, may appear, it loses much of its formidable character, when we perceive that nature herself has divided and subdivided it into larger and smaller assemblages; and that through all, and between all, there is a degree of order and of harmony which enables the mind to contemplate and investigate one portion, without the absolute necessity of grasping at the universal knowledge of all. This order and consistency in the creation, is productive of another advantage: it not only enables us to form correct notions on the leading peculiarities of large groups, without venturing upon the Herculean, or rather endless task of analysing the properties of every species, but it likewise gives us the power of forming just comparisons, by contrasting any one of these groups with others." Again, "the truth seems to be, that the primary types of nature are very few, but that the variation of these types sometimes appears to be all but infinite. Thus no one can mistake a bird for a quadruped, or this again for a fish; one individual from each of these classes is quite sufficient to give us a correct and definite idea of the rest; and yet we have reason to believe, that the form of a bird can be varied without the least departure from its characteristic structure in more than six thousand different ways! The typical form of a fish admits probably of eight thousand variations. But these are nothing when we come to annulose animals. The most ordinary observer, if he sees a "creeping thing" walking upon legs, pronounces it, and justly, to be an insect; and yet such is the wonderful and almost inconceivable variety that nature has lavished upon this class, that it is highly probable the aspect of an insect admits of half a million of variations, without such a departure from the great outlines of the original type, as would prevent any one variation from being confounded with a bird, a fish, or a quadruped."

He afterwards passes to the consideration of the primary divisions of the animal kingdom, as proposed by MM. Cuvier, Lamarck, and Virey. Preferring that of the latter, as being most in consonance with nature, he therefore adopts the *Vertebrata*, the *Annulosa*, and the *Mollusca*, as the three primary circles of the animal kingdom, the two first forming the typical and subtypical groups, the latter the aberrant, composed of the three minor circles of the *Mollusca testacea*, Testaceous Mollusca, the *Acrita* or Polypes, and the *Radiata* or radiated mollusca. The peculiar characters of each division are also detailed, as well as the manner pointed out, in which they blend the one into the other, so as to constitute one great circle, composed of the *Acrita, Mollusca, Vertebrata, Annulosa*, and *Radiata*.

The Mammalia, as being the most complicated in their organization, as well as the most perfect in their senses, he naturally places at the head of the vertebrata, and their more obvious characters are defined, as, Female suckling her young; body covered with hair or fur; possessing four legs; warm blood; and living upon the ground. Not one of these characters, however, is perfectly absolute, but, taken collectively, they are sufficient to discriminate a quadruped from all other animals at present in existence. Birds (Aves) follow next in rank to quadrupeds, having an organization less complicated, and an inferior degree of intelligence. They are characterized by having only two legs, corresponding to the hinder pair in mammalia, the anterior being represented by the wings. The body is clothed with feathers, the blood warm, and the young are produced from eggs hatched by the parent.

The third great division, composed of the circles, Reptilia, Amphibia, and Pisces, contains animals much inferior in organization and intelligence to the two former, and peculiarly distinguished by having cold blood, and a body either entirely naked, or covered with scales, besides the negative characters of neither suckling their young like quadrupeds, or flying in the air like birds. These are the characters possessed by the aberrant group as a whole, and which distinguish it from the quadrupeds and birds; but as it is composed of three minor circles, each of these in addition possesses distinctions of its own. The analogies of the Vertebrata to the primary divisions of the Animal Kingdom are then glanced at, and they appear to stand thus.

Mammalia,	-	Vertebrata,
Aves,	- -	Annulosa,
Pisces,	- -	Radiata,
Amphibia,	-	Acrita,
Reptilia,	-	Mollusca testacea.

The characters he selects for the arrangement of the Mammalia, in their primary circles, are the feet and the teeth, as being parts readily seen and easily understood, and as having a direct influence upon their peculiar economy; the first being remarkable as the organ of motion, the latter as indicating the nature and quality of the food upon which they subsist. We cannot, however, agree with Mr Swainson in thinking, that the internal structure and comparative anatomy of animals belong more properly to the province of the physiologist than that of the naturalist, for although external characters alone may in general be sufficient for the purpose of indicating natural groups, we consider them to be so intimately connected with internal peculiarities of organism, that to understand and appreciate the value of the one requires the study and knowledge of the others; in fact, that no one is entitled to the name of a naturalist, who limits his observations and researches to the mere external aspect of the beings with which he is engaged.

The primary types of the Mammalia he considers to be, 1st, The *Quadrumana*, defined as possessing the three sorts of teeth, viz. incisors, canines, and molars; the extremities of the four limbs performing the office of hands, one of the toes being opposible to the others, and acting as the thumb. 2d, *Feræ*, also with the three sorts of teeth, but the canines very large, the thumb or fifth toe placed on the same plane with the others, the claws often retractile. The aberrant group, or the three aberrant circles, as they have not yet been proved to constitute a circle within themselves, are distinguished by their imperfect and variable dentition the under jaw being generally without the canine teeth. These groups are known by the names of the *Ungulata, Glires*, and *Cetaceæ*. The analogies of the orders of the Mammalia to those of the class Aves, are considered to stand thus,—

Quadrumana,	-	Insessores,
Feræ,	- -	Raptores,

Cetacea,	-	Natatores,
Glires,	- -	Grallatores,
Ungulata,	-	Rasores.

A position, it will be observed, in regard to the Glires and Ungulata, different from that assigned to them by Mr M'Leay, but which we consider as more in consonance with the true analogies of the groups, and supported by a more extended analytical investigation of their contents. According to our author, the quadrumanous order is composed of the following families or primary divisions; 1st, The *Simiadæ*, or Apes and Monkeys of the Ancient World: 2d, The *Cebidæ* or those of the New World, constituting the typical and subtypical groups; 3d, The *Lemuridæ*, or Lemurs; and 4th, the *Vespertilionidæ* or Bats, properly, we think, transferred to this order, (the station first assigned them by Linnæus), from that of the Feræ, in which they were placed by Cuvier. These form two of the aberrant divisions; the third, which ought to represent the aquatic type, is wanting, or has not yet been discovered. He then enters into an interesting detail and analysis of the first group, Simiadæ, showing that the circle is perfect and complete, even following the arrangement of the family according to the analysis of MM. Cuvier and Geoffroy St Hilaire, from whence he deduces the important inference, that Man, considered merely as a reasoning biped animal, cannot enter into the circle of this, the typical family of the Quadrumana, much less into that of any other division of the order. The *Cebidæ*, or monkeys of the New World, which constitute the subtypical group, are distinguished by their inferior size, and the universal appendage of a tail, which member in the typical groups is long and prehensile. The wide space or septum between the nostrils is also a strong mark of discrimination, and they are besides destitute of cheek-pouches and callosities. The five typical forms of this family are represented by the genera *Mycetes*, *Cebus*, *Callithrix*, *Hapales*, and *Pithecia*, and the passage from the *Cebidæ* to the next family or *Lemuridæ*, is effected by the intervention of the *Aetus trivirgatus*, Humb. an animal possessing characters almost intermediate between them. The genus *Lemur*, distinguished by the long and ornamented tails, and the frugivorous habits of its members, he considers the typical group, assigning the subtypical station to the genus *Otolictnus*, Ill. the members of which, in their general habits, are carnivorous. The aberrant groups are supposed to be represented by the genera Aotus, Ill. *Cheiregaleus*, Geoff., and *Galeopithecus*, Pall., which last, from its flying membranes, or the loose naked skin that connects the limbs, and supports them in their leaps from tree to tree, as well as their nocturnal habits, and insect-food, lead directly to the *Vespertilionidæ* or bats, the most aberrant family of the order, and constituting its suctorial type. His observations on the arrangement of this division are very short, and he adopts without any change the types of the sub-families, as pointed out by Mr Gray, viz *Rhinolophinæ, Phyllostominæ, Pteropinæ, Noctilioninæ,* and *Vespertilioninæ.*

The Feræ or rapacious order, the subtypical division of the Mammalia follows next in succession, but of this and the remaining orders he does not profess to enter into a minute analysis of the minor groups, or the location of the genera in their natural series, which would require more space than the nature of the work permits, and more labour than he has been able to bestow upon them; he therefore contents himself with pointing out what he considers to be the primary types and divisions of each, and the mode in which the different circles are connected with each other. The five groups of the Feræ are the *Felidæ* and *Mustelidæ,* the *Didelphidæ, Sorecidæ,* and *Phocidæ;* the two first forming the typical and subtypical families, the three latter the aberrant. He commences his notice of them, with the *Didelphidæ* or Opossum family, by which on one side the ferine order is immediately connected with the *Quadrumana,* while it leads by the genera *Cladobates,* or that of *Gymnura,* Raffles, to the *Sorecidæ,* and to the *Mustelidæ,* in all probability by the genus *Arctitis.* Besides the genus *Didelphis,* restricted to the American marsupiate opossums, and the group of which *Did. dorsigera* is the representative, it contains the *Dasyuri* or brush-tailed opossums of Australia, &c. The passage from this family to the *Sorecidæ,* which corresponds without variation to the Insectivora of Cuvier, is effected by the *Gymnura Rafflesii,* an animal bearing a near affinity to the *Cladobates* or *Tupaia* of Raffles. Of this family, the shrew mice, genus *Sorex,* are considered the typical representatives; among its members may be enumerated the hedgehogs (*Erinaceus*), the moles (*talpa*), and other animals nearly related to them, and belonging to the genera *Scalops, Chrysochloros, Centenes,* &c.

The *Phocidæ* (Seals), the last of the aberrant groups, and constituting the aquatic division of the order, stands at present almost isolated from the foregoing families, and, as Mr Swainson observes, almost equally disconnected with the typical Felidæ. This, however, we must suppose, arises from our ignorance or non-discovery of the intermediate forms necessary to show their connection; as there can be no doubt, from their dentition and carnivorous habits, that these animals strictly belong to the Ferine order, and, as the aquatic type must be followed by the typical group of the *Felidæ.*

The seals, generally so called, whose natural history has hitherto been much neglected, and the Morse or Walrus, are the only divisions at present recognized. These animals, by their affinity to the Dugongs, shew in what way the union of the Ferine order with the *Cetaceæ* is effected.

The *Felidæ* or typical division of the rapacious animals comes next under review. Of this family, as well as of the entire order, the group including the lion, tiger, panther, and other cat-like animals, is justly considered pre-eminently typical, and is designated as the sub-family *Felinæ.* By the genus *Cynailurus* (hunting-leopard), they pass into the next group composed of the hyænas, whose union with the dogs *(Caninæ)* is satisfactorily established by means of the *Canis venatica* of Burchell, and the *Lycaon Burchellii* of Brooks. In this latter group is included, not only the true dogs or genus *Canis,* but the wolves, foxes, and the fennecs *(Canis cerda,* Rupp.*)* As the type of the fifth or aquatic group of the Felidæ, he suggests the probability of its being represented by the genus *Thylacinus,* Temm. an animal of Australia, and formerly associated with the oppossums, under the name of the dog-faced oppossum. Its dentition, however, as well as its form and habits, certainly indicate a much nearer affinity to the Felidæ than the Didelphidæ, although possessing the marsupial pouch; and near to it also he would place the *Dasyurus ursinus,* Temm. another large carnivorous marsupiate animal. It must be acknowledged, however, that further observation, and a strict analytical investigation of the various groups, is necessary, before the true station of these animals can be satisfactorily established. The *Mustelidæ* or weasel family, which form the subtypical division of the order, come next under consideration. They are, he says, for the most part eminently carnivorous and ferocious, yet of small size and slender shape. As they are more numerous than the last family, their forms are more diversified, and we consequently find that some of the aberrant divisions present a striking difference from those which are typical. To the latter, however, we must always direct our first attention, when endeavouring to define the leading characters of a family. The chief groups, therefore, of the *Mustelidæ* are composed of the weasels and the polecats; these, by various intermediate genera, are connected with the racoons, badgers, and gluttons; the series finally terminating in the bears, which stand at the furthest confines of the series. After shewing that the plantigrade and the digitigrade divisions of M. Cuvier are indefinite and artificial, he proceeds to enumerate the sub-families or five typical forms of which it is composed. The first mentioned is that represented by the genus *Ryzæna*, an animal in the opinion of many naturalists approaching nearer to the dogs than to any other of this family, except it be the *Cynictis* of Mr Ogilby, an animal recently brought from South Africa, and which that gentleman considers as connecting the Viverrinæ with the dogs. The gennets or Viverrinæ, constituting the sub-typical group, contains the genera *Crossarchus*, *Herpestes*, *Genetta*, *Viverra*, and probably *Paradoxurus*. The *Mustelinæ* or typical group are distinguished by their purely carnivorous habits and thirst for blood. In addition to the genera *Mustela*, *Martes*, *Mephitis*, *Mydaus*, &c. the otters also belong to it; and he adds, " it will be a question for future investigation, whether the *Gluttons* (*Gulo*), the *Rattels* (*Ratelus*), and the badgers (*Meles*), form the aberrant portion of the ursine circle, or whether they represent the bears, and enter into the circle of the *Mustelidæ*." The ursine or genuine bears follow next, among which he includes the sloth-bears, *Prochilus*, Ill. and the Balisaur or *Arctonyx collaris*. From these to the racoons the gradation is easy and natural. To this latter group belongs the genus *Nasua*, which shews a decided affinity to the *Ryzæna*, indicating that the Mustelinæ form a circle within themselves. Before he passes to the next order, he adverts to the considerations which induced him to separate the carnivorous from the herbivorous Marsupials, and to break up the order Marsupiata of M. Cuvier. " Nearly all our leading naturalists have acknowledged the artificial nature of this assemblage, uniting, as it does, animals of the most opposite natures, and of the most dissimilar organization, merely from the circumstance of their possessing a marsupial pouch. Upon what reasons M. Cuvier, by instituting this order, was induced to violate the very first principles of his own arrangement, which every one sees is mainly founded upon the structure of the teeth—we know not; but this single circumstance is sufficient to excite the strongest suspicion, that his arrangement is not natural. This at least, was the conclusion at which we arrived, after the most matured investigation we could give the subject, and after endeavouring in vain to discover a circular series among the marsupial animals." In this view of the subject, he is supported by the weighty opinion of the late Mr Bennet, who had deeply studied the structure and affinities of the marsupial animals; and we consider the act alone of breaking up an order so artificial, and the arrangements of its contents more in accordance with their affinities and general organization, an attempt well deserving the thanks of the naturalist.

The notice of the Cetaceæ or aquatic order, as might be expected from our comparative ignorance of the habits of the species, and the paucity of the types discovered, is very brief, and no attempt is made to determine the natural divisions. Its connection with the Feræ is supported by the affinity that the *Phocidæ* evidently show to the Dugongs or herbivorous whales, which latter animals also serve to connect the Cetaceous order with the *Ungulata*, by means of the Hippopotamus; but no forms have yet been discovered to show in what manner its union with the *Glires* is effected. The *Ungulata* or hoofed order which follows, are known "by the peculiar construction of their feet, the extremities of which are entirely surrounded or inclosed in a horny covering or sheath, a structure by which they are distinguished from all the other land quadrupeds, whose toes are merely tipped with claws, or protected outwardly by nails. The primary divisions or tribes of this conspicuous group, are, according to our author, the *Solipedes*, of which the horse is typical; the *Ruminantes*, distinguished by their cloven hoofs and horns; these two represent the typical and subtypical divisions. The aberrant are the *Anoplotheres*, so named in reference to their fossil type, supposed to be now represented by the tapirs, pigs, &c. The *Pachydermes*, containing the largest existing land animals, as the elephant, rhinoceros, &c. and the *Edentates*, forming the most aberrant division of the order, this group, he remarks, forms a solitary exception to all the preceding, in having distinct toes, and very large nails; but those nails are unlike those of all other quadrupeds, and M. Cuvier well observes, "that they approach more or less to the nature of hoofs." The circular series of these divisions he endeavours to trace in the following manner:—The Solipedes pass into the Ruminants by the camel; the tapirs, which show an intermediate form between the ruminants and the armadilloes, connect the *Anopletheres* with the *Edentates*; the Sloths, which belong to the latter, lead directly to the fossil genus *Megatherium*, in the circle of the *Pachydermes*, and the return to the Solipedes is supposed to be effected by means of the hippopotamus; though we confess the affinity seems distant, and that some intermediate forms are wanting to bring these divisions into juxtaposition. After a few observations upon the genus *Equus*, and showing that the camel group belongs to the circle of the *Solipedes*, and is the connecting medium between it and the *Ruminantes*, he takes a hasty view of the principal forms of the *Pachydermes*, composed of the first section of Cuvier's order Pachydermata ; he then passes to the *Edentates*, which differ greatly from each other, both in general appearance, and in the characters of their dentition, but are nevertheless united by some natural relations of a positive nature. The Sloths (*Bradypus*) are noticed as forming one group, the ant-eaters (*Myrmecophaga*,) armadillos *Dasypus*, and *Chlamyphorus* a second, and the *Echidna* and *Ornithorynchus* a third, supposing that these two upon a strict analysis actually belong to this division. He then adverts to the Anoplotheres, which he considers entitled to a place among the leading divisions of the Ungulata, from the nature and form of their hoofs and toes. Of these the fossil Anoplotherium of M. Cuvier is the type, and as existing forms of this group, he cites, though doubtfully of some, the genera *Sus*, *Tapirus*, *Dicotyles*, and *Phascochœrus*.

The chapter concludes with some interesting remarks upon the fossil remains of these and other animals. After some interesting observations upon the structure and form of the Ruminants, and a well deserved tribute of praise to the researches of Major C. Hamilton Smith, whose views in regard to the affinities of the animals belonging to this tribe, our author has generally and closely followed, he states the five families or primary groups of the Ruminants to be, the *Antelopidœ*, *Bovidœ*, *Cervidœ*, *Moschidœ*, and *Camelopardœ*, the two first forming the typical and subtypical group, the three latter the aberrant. Of each of these divisions, and the minor groups they contain, he gives a summary account, principally taken from the writings of Mr Smith, and at the same time he shows in what manner they are connected and pass into each other. In his observations upon the *Bos Scoticus* or *wild ox*, existing in some of our parks we do not agree, as we consider them merely varieties of the *Bos taurus*, and very nearly akin to the kyloe, nor do we think them naturally more savage and untameable than the latter would show themselves if placed in a similar situation, and treated in the same manner. We know, besides, that they breed freely with the common ox, and that the progeny produced from the cross is also productive, and it is a well ascertained fact, that, if taken young, they become as tame as any of the common breed.

The union of the *Solipedes* with the Ruminants he considers is effected by the Giraffe (*Camelopardalis*) whose affinity to the camel is acknowledged by Major Smith, and, as he observes, did not even escape the notice of the ancients. The fifth, and last order, is that of *Glires*, so named by Linnæus, the Rodentia of M. Cuvier. The chief characters of the typical groups, consist in the total absence of canine teeth, and the articulation of the lower jaw being also so constituted as only to admit of a horizontal motion backwards and forwards; but this, as he observes, " is in strict conformity with the mode of eating of all rodent animals, the food being divided by the long incisors, and triturated or ground by the molars. He then enters into and illustrates the analogies of this order with the wading-birds, (Grallatores,) bringing into comparison, with great skill, the different points of resemblance between them, many of which are too striking not to carry immediate conviction of their truth, though others, we are aware, are of that distant nature, which require analysis and intimate knowledge of the subject before they can be fully understood or comprehended. We have no hesitation, however, in stating our conviction, that Mr Swainson's theory, in regard to the analogies of this order, is the true one, and that the Glires constitute the tenuirostral or Suctorial type, and not the Rasorial, as Mr M'Leay endeavoured to prove in the essay previously adverted to. No attempt is made by the author to point out the five primary groups of this order. He therefore takes a rapid review of M. Cuvier's divisions, under the titles of *Beavers*, *Rats*, *Marmots*, *Squirrels*, *Porcupines*, *Hares*, and *Cavies*, pointing out the peculiarities of the groups, and the forms by which some of them probably pass into each other. He concludes this part of the volume with some further important observations upon the herbivorous marsupials. Upon a review of the characters of the various genera of the herbivorous marsupials, his impression appears to be decidedly in favour of placing them in the circle of the Glires, of which order they will probably form an aberrant group, representing the Rasorial type, and if so, then the connection of this order with the *Ungulata* will be effected by the kangaroo, an animal which, in its bulk, habits, and physiognomy, certainly indicates an affinity or resemblance to the deer and other grazing animals. Much, however, must necessarily depend on the result of a strict analysis of this order, which has not yet been attempted, even in respect to its primary groups. Till that is done, hypothesis and conjecture are only likely to lead into error and confusion.

II.—*Suites à Buffon, formant, avec les œuvres de cet auteur un cours complet d'histoire naturelle. Collection accompagnée de planches. Diptères,* par M. Macquart. Tom i. 1834.—*Species général des Lepidoptères,* par le Dr Boisduval. Tom. i. 1836.

Judging from the volumes which we have had an opportunity of examining, the *Suites à Buffon* promise to form one of the most valuable contributions to natural history that has appeared for a considerable time. The design is an extensive one, and its successful completion will entitle the projectors to the gratitude of all the cultivators of natural science. It embraces a comprehensive view, descriptive and historical, of all the different departments of the animal kingdom which were not adequately treated of by Buffon. As supplementary, therefore, to the works of that eminent writer, this series relates chiefly to the invertebrate animals, the natural history of which was comparatively little understood in his time. It is estimated to extend to about 45 octavo volumes, a considerable number of which have been already published, and the rest are promised at monthly intervals. The authors entrusted with the respective departments have long made them a subject of careful study, and in general are well known to naturalists by works already published in relation to them. In the entomological department, to which for the present we mean to restrict our observations, we find the names of De Jean *(Coleoptera),* Boisduval *(Lepidoptera),* Le Peletier de Saint Fargeau *(Hymenoptera),* Audinet Serville *(Orthoptera, Neuroptera* and *Hemiptera),* Lacordaire *(Introduction to Entomology),* and Macquart *(Diptera),* all of whom have already shewn their intimate acquaintance with the different branches they have undertaken to illustrate.

The last named individual first became known in this country by his work on the Dipterons insects of the north of France. This production affords a detailed description of all the species found by the author in the district alluded to, accompanied with a pretty full account of their general history, and generic distinctions. It is not, however, distinguished for originality, comparatively little important information being supplied that is not to be found in Meigen's admirable work on the two-winged insects of Europe, from which in most cases the descriptions have been little more than translated. In one instance, perhaps, he may be admitted to have improved on his model, by taking more particularly into account the neuration of the wings, from which he has been enabled to deduce characters of the greatest importance in the definition of natural groups.

The present work is of a more comprehensive character. Besides describing the species known to be natives of France, as well as such kinds belonging to the adjacent districts as are thought *likely* to occur in that country (of course indicating the latter by a distinctive mark), the types of other European genera are noticed, and an account given of the principal foreign Diptera found in French cabinets, with a view of supplying the deficiencies of Wiedemann's Exotic Diptera. In order to accomplish these various objects within a limited space, the descriptions and general history are very much condensed, but no important fact appears to be omitted. Being now familiar with the subject, the author acts a more independent part, and proposes various new genera, most of them on such judicious grounds that they can scarcely fail to be generally adopted. One of the most valuable parts of the work, and which tends more than any other to facilitate the study, is the synoptical tables of the genera prefixed to each family. Upon the whole, a safer guide than Macquart in the study of this interesting tribe of insects, cannot be obtained, not only on account of his own intrinsic merits, but as being the most recent writer on the subject, and consequently able to avail himself of all that is most valuable in the works of his predecessors; and this he must be admitted to have done with considerable judgment.

The accompanying fasciculi of plates merit the praise of considerable accuracy, and are therefore useful as illustrating the text, but they are executed with little taste, and have scarcely any value as works of art. In the productions of Curtis, Westwood, Swainson, and others, we are now becoming familiar with such elegant delineations of insect forms, that this defect appears more conspicuous than it would have done at a former period. The cheapness of the French plates constitutes their principal recommendation, but even this does not appear incompatible with a more tasteful execution; if it be, no one would refuse to sacrifice something to the graces.

To Dr Boisduval none of our entomological readers require any introduction. He has long since established a claim on their favourable regard by the publication of various valuable papers on insects, particularly that relating to the natural history of those of Madagascar. The lepidopterous tribes especially, have been his favourite study, and in the work cited above, (viz. *Species Général*) we have the fruit of an almost uninterrupted attention to the subject from the time that he was fifteen years of age.* We doubt not but that it will be admitted by all to bear honourable testimony to his diligence and success. For ourselves we can affirm, that we have not of late often met with a work on natural history conceived in a sounder spirit, and executed with so much judgment and discrimination. Every one who studies this elegant tribe of insects, must have long felt the want of such a publication. No general description of species has appeared since that of Godart, forming a part of the *Encyclopedie Methodique*. That valuable and elaborate production, however, is not adapted to the present state of the science, multitudes of new species having been discovered since it was written, and numerous improvements effected in the mode of arrangement.

The task which Dr Boisduval has undertaken is by no means an easy one. Latreille has somewhere asserted that a good classification of the Lepidoptera is the touchstone of systematists. The difficulty arises from the want of prominent characters. It is easy to distinguish numerous groups by a certain peculiarity of aspect and similarity of design in the colouring, but no sooner is an attempt made to define them in a rigorous manner, than it is found that recourse must be had to characters of very subordinate importance, almost always minute, and of difficult application in practice. This uniformity of organization among the Lepidoptera, results from, or occasions, the uniformity that exists in their mode of taking nourishment. The nectar of flowers and the juices of vegetable matter form their only food. There is no need, therefore, for that variety of structure observable in tribes, (the Coleoptera for example,) which are destined to live on almost every kind of organized substance, from the hardest ligneous tissue to a semifluid animal matter.

The difficulties in the way of a lucid arrangement inherent in the subject, can scarcely be said to have been diminished by the mode in which it has been handled by many modern naturalists. The numerous "Illustrations" of Lepidoptera published of late years have been *partial*, being either selections from the whole class, or forming part of a local Fauna. In either case the subject is regarded in too insulated a light. The illustrator of foreign butterflies selects a species, and by giving prominence to all its minute characters, proposes it with considerable plausibility as a distinct genus. The local faunist divides his groups in reference to his own limited sphere of observation. Neither contemplates the possibility of being ever called upon to elaborate a general system, and he leaves it to those who are to reconcile all existing inconsistencies. Hence it follows, that so many of the genera proposed in local and partial works, can find no place in a general one, for, however specious they may look when standing alone, it is often found that they will not unite into a consistent whole, and they may be therefore said still further to embroil the very subject they were designed to illustrate.

---

* Preface to *Species Général.*

In the want of tranchant characters in the perfect insects, Dr Boisduval thinks himself justified in taking into account such as are presented by the caterpillar and chrysalis. This method, to a certain extent, has been often adopted before, and is not objectionable; for although it would be more convenient to derive the characters from the butterflies in order to facilitate the identification of species, it cannot be denied that their individuality is the same in all forms. His genera are sufficiently numerous, but he appears to have established or adopted none but such as were indispensable. We have no doubt but that he will be blamed by some for not subdividing with a less sparing hand. His genus Papilio has quite a Linnæan aspect, comprising 224 species: Pieris contains 166, and Terias 53. These great genera are divided into groups, founded on the form of the caterpillar, the pictorial design and shape of the wings. the *facies*, and finally the native country of the insect. These groups, however, are given without characters, on the plea that they are too minute; an omission which greatly impairs their value.

Our author divides the order Lepidoptera into two grand *Legions*, which he names RHOPALOCERES, having club-shaped antennæ, and HETEROCERES, with variable antennæ. The former, which corresponds to what we are accustomed to call Lepidoptera diurna, he divides into three *sections*, in consequence of the manner in which the chrysalis is secured; 1st, *Succincti*, having the chrysalis attached by the tail and a band round the middle; 2d, *Suspensi*, chrysalis suspended by the tail only; 3d, *Involuti*, chrysalis enclosed in a cocoon. The first of these sections contains the *tribes*, Papillonides, Pierides, Eumenides, Lycenides, Erycinides, Peridromides; the second, Danaides, Heliconides, Nymphalides, Brassolides, Morphides, Satyrides, Biblides, Libythides; the third, the Hesperides.

As in most arrangements, the great genus Papilio commences the series, or rather the group named Ornithoptera, which includes several of the largest and most conspicuous kinds formerly referred to Papilio. The type of this new genus is the magnificent *P. Priamus*, which, with its associates, are all natives of the great islands in the Indian Archipelago. As an example of the valuable information supplied by this work, we may refer to the account of *Papilio Memnon*, under which our author proves that no fewer than six or seven kinds, hitherto regarded as distinct, are mere varieties of that protean insect. The descriptions are of considerable length, and formed on the model of Godart's, whose exact words in many cases the author very properly adopts. In conformity with the plan followed in the whole series, no concise specific characters are given, which will probably be found to be an inconvenience. The present volume extends to the genus *Terias*, and it may be estimated that nearly three other similar volumes will be requisite to complete the Diurnal Lepidoptera alone, on the same ample and satisfactory plan. The plates illustrating this volume are engraved with great care, and form a valuable accompaniment to the text.

Bibliographical Notices.

A Synopsis of the Birds of Australia and the adjacent Islands. By John Gould, F. L. S., &c. Part I. Royal 8vo. 1837.

Mr Gould thus expresses himself in the prospectus to this work: "The author trusts that the present work will not be deemed uncalled for; more especially as not only are we less acquainted with the natural forms inhabiting this portion of the globe, differing, as they do, so widely from all others, whether belonging to the old or new world. The author, therefore, conceives, that a work on the birds of these countries cannot fail to be of the greatest interest, not only to the naturalist and scientific men of our own country, but to those of Europe and America, as well as to the inhabitants themselves of these distant colonies; and he is farther induced to commence such an undertaking, having at this moment in his possession an exceedingly rich collection, perhaps the finest extant, of the productions of these countries, among which are a large number of undescribed species."

"The object of the present publication is, in the first instance, to make known, and record in an eligible form, the best accessions which science has latterly acquired from this portion of the globe; and, in order to render it of real value and utility to the men of science of all countries, the author has determined upon giving, besides a Latin and English description, measurements, synonyms, &c. a figure of the head of the natural size of every species, a feature not to be found in preceding works of a similar nature, and by which each bird may at once be distinguished, hitherto a matter of some difficulty, particularly in those that are nearly allied. The work will be published in parts, each of which will contain eighteen plates, with letter-press descriptions.—The price of the work is L. 1, 5s. coloured; 15s. uncoloured; and the letter-press may be had separately for 5s. Full generic characters will be given at or near the close of the work, and a short history of the various groups and their affinities, with what has been ascertained of the habits of the birds, will be added."

The above extracts will give an idea of the plan and objects of Mr Gould's new work. The plates (lithographs) are beautifully and spiritedly executed, and the descriptions are compact and accurate. But having thus expressed our high opinion of the work, we have to regret the want of condensation which we like to see, and understand should be contained in a synopsis; while the introduction of the characters of the *new genera*, even though they should have to be repeated at the close of the volume, would have been of great advantage to the student. We nevertheless recommend this book as a synopsis beautifully illustrated.

Among the more remarkable forms noticed are *Calodera*, Gould, a genus very properly formed from the bird figured in Ornithological Illustrations by Sir W. Jardine and Mr Selby under the title of *Ptilonorhynchus nuchalis*, remarkable for the beautiful ruff of satiny feathers which adorns the nape. Mr Gould has also been so fortunate as to procure what he considers a second species, which he has named *C. maculata*, adorned also with a somewhat similar nuchal ruff. *Struthidea* is a curious form; and *Neomorpha*, inhabiting New Zealand, two species, is very remarkable; the genus seems allied to *Promerops*, and has the corners of the mouth supplied with large rounded yellow wattles. A second species of *Nestor* is characterized under the title *N. productus*, and has the bill extremely developed. A new genus is proposed, having for its type *Meliphaga lunulata*, *Hæmatops*, Gould; but this, we believe, has been previously named and characterized by Mr Swainson, under the title *Gymnophrys*. Two species of *Zosterops*, from the interior of New South Wales, are noticed in addition to the well-known *Z. dorsalis*.

Birds of Europe. By John Gould, F. L. S. London, Folio.

Parts 20 and 21 of this fine work are nearly completed, and will appear together. These numbers were expected to have contained all the European birds, but it has been found that another (Part 22,) will still be necessary. In this some extremely rare birds will be figured, such as *Accentor montanellus*, *Caprimulgus ruficollis*, *Sylvia sericea*, and *lucinioides*, &c.; specimens of which have been forwarded to Mr Gould by the Directors of the Imperial Cabinet of Vienna, while the curators of the museums at Leyden and Berlin, are acting with the same liberality in respect to the rare, sometimes unique specimens, which these collections possess.

Illustrations of Ornithology. By Sir W. Jardine, and P. J. Selby, (New Series.) No. I. Edinburgh, Lizars, 1837. 4to. and imp. 4to.

The first Number of this "New Series of Ornithological Plates" is published, and contains figures of *Pernis apivorus, Hypsipetes Ganeesa, Brachypus eutilotus,* n. s., *Janthocincla squamata, Columba princeps, Crax Yarrellii.* The parts will appear at intervals of from six weeks to two months, and will each contain six illustrations, accompanied by descriptions, and occasional wood-cuts representing the characteristic parts of new or little known genera.

Transactions and Periodicals—*British.*

Transactions of the Linnæan Society of London, Vol. xvii. Part the Third. 4to. London, 1836.

A continuation of the volume and commencing with——XV. *Descriptions &c. of the insects collected by* Captain P. King, R. N., F. R. S., *in the Survey of the Straits of Magellan.* By John Curtis, Esq., A. H. Haliday, Esq., and Francis Walker, Esq. Mr Curtis remarks, in a short introduction to the paper, "The collection was formed along the coast from St Paul's in Brazil to Valparaiso. The splendid objects of natural history that have been found from time to time in Brazil, and sent to Europe, render it less easy to detect novelties in that country, but those from the opposite coast of Chili are less known, and I have never seen any collection from the extreme south of the New World excepting the present one. It is curious and interesting to trace the similarity that exists in many instances between the corresponding parallels of the southern and northern hemispheres, and in others to observe the analogues which take the place of absent types. Throughout the whole of South America, for example, the genus Carabus appears to be unknown, excepting about lat. 50°, where a species of that group, with a narrow thorax, has been found. The genus Culex also occurs, and many others might be noticed that not only approach, but are identical with the typical forms of North America and of Europe." The paper is devoted to the Hymenoptera by A. H. Haliday, Esq. and the Diptera by Francis Walker, Esq. Of the former, fifty-five species are described; of the latter, seventy-eight, a great proportion of each being marked as new. The descriptions are entirely Latin, the locality and an occasional remark noted in English, and we have only to regret the scanty proportion of observations which accompanies the specific characters.——XVI. *Description of a new species of the genus Cameleon.* By Mr Samuel Stuchburg, A. L. S. *Cameleon cristatus.*—"Superciliari occipitalique carina elevata et crenulata, caudæ anteriori parte dorsique apophysibus elongatis cristam dorsalem constituentibus; squamis fere rotundis subæqualibus." It is from the river Gaboon in Western Æquinoctial Africa, and is illustrated by an uncoloured lithographic plate.——XVII. *Observations on the genus Hosackia and the American Loti.* By George Bentham, Esq. A new genus is proposed for the Uniflorous Loti, under the title *Microlotus.* Eleven species of Hosackia are characterized, and five *Microloti.*——XVIII. *Cha-*

racters of Embia, a genus of Insects allied to the White Ants, (Termites;) with Descriptions of the Species of which it is composed. By J. O. Westwood, Esq. Three species, under the generic titles of *Embia*, *Oligotoma*, *Olyritha*, are characterized, and illustrated by an uncoloured plate drawn by Westwood. ——XIX. *De Marchanteis.* Auctore Thoma Taylor. Written entirely in Latin, and giving the characters of the "*Genera et species quas mihi fortuna obtulit.*" Illustrated by four uncoloured plates.——XX. *On a New Arachnide uniting the genera Gonyleptes and Phalangium.* By the Rev. F. W. Hope. An Arachnide contained in the collection of the late Adrian Hardy Haworth, remarkable for its long hinder legs, proposed as the type of a new genus by Mr Hope, *Dolichoscelis* (δολιχὸς and σκέλος) and dedicated to Mr Haworth, *D. Haworthii.* Illustrated by an uncoloured plate.——XXI. *On the Erigoneæ, a tribe of the order polygonaceæ.* By George Bentham, Esq. Illustrated by four plates of *Erigeron, Chorizanthe, Mucronea.*——XXII. *Observations on the Species of Fædia.* By Joseph Woods, Esq. This paper chiefly illustrates the subdivisions of Decandolle, taken from the structure of the fruit.——XXIII. *Remarks on some British Ferns.* By David Don, Lib. L. S. *Aspidium Dumetorum* must be erased from Brit. list. (See our *Botanical Intelligence*)—*Nephrodium rigidum* Mr Don considers a good and well-marked species. For some remarks on *Asplenium Filix Fæmina*, see *Botanical Intelligence.*—*Cystea Dentata*, a good species, peculiar to the Scottish Alps, the Welsh plants being considered only varieties of *C. fragilis.*—*Cystea regia* is considered distinct from *C. Alpina.* There is now no British station for this plant, the original one at Low Layton no longer existing, and the Welsh specimens belong to *C. fragilis.*——XXIV. *Descriptions of Five New Species of the Genus Pinus, discovered by Dr Coulter in California.* By David Don, Lib. L. S. Collected by Dr Coulter, who has spent ten years in the investigation of the natural history of Mexico and California. These pines are described from imperfect specimens, which prevent the characters being completed; there is, however, little doubt that they are distinct. They will all prove hardy, and we trust will soon be raised in this country.——XXV. *Some account of the Galls found on a species of Oak from the Shores of the Dead Sea.* By Aylmer Bourke Lambert, Esq. The "Mala Insana" of Hasselquist, and proved to be identical with the galls of commerce, and growing on the *Quercus infectoria.* Illustrated by a coloured plate.——XXVI. *On several New or imperfectly understood British and European plants.* By Charles C. Babington. Mr Babington is convinced of the *distinctness* of Erica Mackaiana. Seventeen species are noticed, and annotated on.

The Edinburgh New Philosophical Journal. Conducted by Professor Jameson. October 1836, January 1837. Edinburgh, A. and C. Black. 8vo. (Continued from p. 402.)

Zoology.

1. R. Jameson, Esq. *Assistant-Surgeon, 10th Regiment of Foot.*—Notes on the natural history and statistics of the island of Cerigo and its dependencies. 62. Continued from the last Number of the Philosophical Journal, and devoted to the zoology of the island. The departments are treated of separately, a few paragraphs being devoted to each.—*Invertebrate Animals.* Very slight notice is taken of these, and insects are passed over as "requiring more space than can be at present afforded." A remark is made that molluscous animals

are rare, "on account of their forming a *chief article of food during the long fasts prescribed by the Greek church*."—*Vertebrate Animals*. "The animals of this great division are few in number." *Fishes*.—In autumn shoals of *Hemiramphus* appear on the coasts, and are caught by lines trailed on the surface-water. The species most commonly met with in the markets are, the genus *Percis*, *Smaris vulgaris*, *Sargus*, *Pagrus vulgaris*, *Crysophrys aurata*, *Serranus scriba* and *cabrilla*, *Trigla lyra*, *and hirundo*, *Mullus surmuletus* and *barbatus*, *Scorpetta*, *Cottus*, *Trachinus*, *Zeus*, *Caranx*, *Cybium*, *Dentex*, *Crenilabrus*, *Labrus*, *Torpedo*, *Ophysurus*, *Pleuronectes*, *Scyllum*, *Trygon*, *Hemiramphus*, *Sygnathus*. A more extensive list than is generally met with in other markets. *Reptiles* are not abundant. Among those mentioned are, *Lacerta agilis*, *Coluber berus*, *Rana esculenta*, and *Bufo vulgaris*. *Birds*. "In Cerigo stationary birds are few in number, but hosts appear, remaining a longer or shorter period in spring, on their passage north to spend the summer in more temperate climes, and in autumn on their return." A list under the different seasons in which their visits are made is given, too long to extract, but containing European species only. Only four or five birds are mentioned as truly indigenous, a remarkable feature in the zoology of the island. Quails are very abundant, and the inhabitants catch them much in the same way that an entomologist secures his prey, by means of an oval net at the end of a long pole; a party of three will sometimes secure twenty or thirty couples during the day. *Quadrupeds* existing now in a wild state are few. *Canis aureus*, *Vespertilio murinus*, *Rhinolophus f. equum*, *Mustela foina*, *Lepus timidus* and *cuniculus*, *Mus rattus* and *musculus* are all that are noted; the Vespertilionidæ will, however, be most probably underrated. Of the domestic animals, an average of five years in Cerigo gives annually 3132 horned cattle, 5524 goats, sheep, 16,809. The hog is an inmate of every peasant's cottage.——II. *Memoir on the Chemical composition of Asses milk*. By M. E. Peliget. (Translated from the French.)——III. *Farther preliminary notices regarding Fossil infusoria*. By Prof. C. B. EHRENBERG. (From Poggendorff's Annalen.)——On the Unity of Structure in the Animal Kingdom. By MARTIN BARRY, M. D. A paper strongly advocating the view of the subject which is stated in the title.——Observations upon the Fossil Polypi of the genus Eschara, read before the Academy of Sciences, Paris. By MILNE EDWARDS. ——Observations regarding Fossil Infusoria. By Professor EHRENBERG.—(From Wiegman's Archiv.)

Botany.

On the relations of colour and smell in the more important families of the vegetable kingdom, translated from Ueber das Licht vor Zugtweiss uber die Chemischen, &c. An interesting paper, illustrated by numerous tables exhibiting the ratio in which smell exists in plants of various colours. The results of the examination of 4200 plants are given.

Loudon's Magazine of Natural History. New Series. January and February 1837. (Continued from p. 490.)

THE new series has begun with a decided improvement, first in the quality of the papers admitted, and 2dly, in the exclusion of some things which tended to lower the character of the Magazine in its primary epoch. We also like the practice now adopted of giving us "Translations" from the foreign journals, although it is to be regretted that in the selection of these papers the Editor must be guided, not by their merit, but by the smallness of the cost at which they can be got up. There are some admirable essays in the Annales des Sciences, &c., both botanical and zoological, far superior in the importance of their subjects, in interest, and in novelty to those selected, but the plates required to illustrate them is a veto absolute, and not to be removed in this country for years to come, —until a love of genuine science shall have displaced that ficklish amateurship now so common, and frequently forsooth held up as a proof of the wide spread which natural history has made among us! Oh Yes, "Illustrations" for the drawing-room,—"coloured figures" for wealthy collectors—too lazy or ignorant to determine their species without this aid—and "Popular Histories" for children, sell all well enough, but let us note the spead of natural science by a higher test, —and how few are they who would subscribe to put into an English dress the essays of Morren, Müller, Dujardin, Edwards, Turpin, Rusconi, and a host of others? We can merely indicate the contents of our contemporary, whose success will give us sincere pleasure.

1. *Zoology.*

BLYTH on the Psychological distinctions between Man and all other Animals; and the consequent diversity of Human Influence over the inferior Ranks of Creation, from any mutual and reciprocal Influence exercised among the latter, p. 1, and p. 77. An essay of very considerable merit.——Description of a new British fish, by Dr ED. MOORE, p. 17. The fish is Peristedion Malarmat, *Lacepede*, the Trigla cataphracta, *Lin.* and was taken between Plymouth and the Eddystone.——BREE's observations upon *Trochilium crabroniformis*, the Lunar Hornet Sphinx, p. 19. This insect is, we believe, of frequent occurrence in the north of England, and south of Scotland. We have lately seen specimens of the Salix caprea cut in Berwickshire, perforated in many places with the grub of it.*——STRICKLAND on the mode of Progression observed in the genus Lima, *Brug.* p. 23.——CHARLESWORTH on the Occurrence of Voluta Lamberti on the Suffolk coast; with observations upon its claim to rank with existing species, p. 35.——Observations upon Voluta Lamberti, with a description of a gigantic species of Terebratula from the Coralline Crag, by ED. CHARLESWORTH, p. 90.

2. *Botany.*

CHRISTY's Notices of Rare Plants collected in Jersey, p. 25.——BOWMAN on the Longevity of the Yew, as ascertained from actual sections of its Trunk; and on the origin of its frequent occurrence in churchyards, p. 28, and p. 85.——BIRD's Remarks on a particular form of irritability observed in the stems of many plants, especially exogens, evinced on dividing them in the direction of their axis, p. 57.——Some observations on the oak, by VON OSDAT, p. 74. We hope to see many papers like the *two* preceding, and no more like this.——Such is a list of the *original* papers in these numbers, for we omit of purpose any notice of the Translations and Reviews.

---

* In Dumfries-shire it is abundant, inhabiting in the larva state S. caprea and the Black Italian poplar. The perfect insect, however, is scarcely ever taken, and specimens are to be procured with certainty only by rearing the caterpillar. —W. J.

Entomological Magazine, No. XVIII. January 1837. (Continued from p. 490.)

Art. 26. Continuation of the "Wanderings and ponderings of an Insect Hunter;" which has extended through several numbers. It is unnecessary that we should express an opinion regarding the character of this effusion; but the propriety may surely be questioned of devoting so large a space to a paper which has no relation whatever to the appropriate and professed objects of the magazine. We admit the difficulty of giving a somewhat popular complexion to a work of this nature, but any attempt made with that laudable view should be in close connection with the legitimate purposes for which it was established. ——27. In striking contrast to the preceding article, this forms a continuation of Mr Haliday's elaborate and valuable paper on *Parasitical Hymenoptera.*—— 28. *Notes on various Insects.* By J. W. Bond. Combat of ants—economy of Clytus arcuatus—nest of the common wasp.——29. *Notes on Diptera.* By F. Walker. These notices of the dipterous species occurring in Britain are calculated to be very useful, for we have yet a most incomplete knowledge of this department of entomology. Besides the citation of numerous localities, Mr Walker describes three new species of *Platypalpus,* as well as other new species, two of which he refers to genera named by himself. We are glad to see that his investigations have extended to Scotland; we have ascertained the existence in that country of several kinds of *Molobrus,* not indicated as having occurred to him there.——30. *Notes of Captures.* By Delta. Additional localities mentioned for some of the rarer Lepidoptera. It is stated that the larva of *Leminitis Camilla,* differs from that figured by Curtis on the authority of Hubner, and that it may be found by carefully hunting the leaves of the honeysuckle. We wish it had occurred to Delta, that a description of this caterpillar would have been greatly more desirable than an extract from Oviedo, touching scorpions.——31. Further observations on the Septenary System. By Edward Newman. A recapitulation of the principles of the septenary system, and affording further illustrations of it, with a view to supply some deficiencies in "Sphinx vespiformis." In the last sentence of his paper, the author expresses his belief, that the most important characteristic of the septenary system now appears to be *radiation from a centre,* in other words, that it is eccentric, a statement, we fear, in which its opponents will be too willing to acquiesce.——32. Notes about *Cillenum laterale* and a sub-marine species of Aleocharidæ. By A. H. Haliday, M. A. The small beetle *Cillenum littorale,* is found abundantly on the shore near Dublin. It preys on sand-hoppers (*Talitrus locusta,* Leach.) A great part of its existence is passed under the sea. The same peculiarity is observable in a minute brachelytrous insect described, apparently for the first time, by Mr Haliday under the name of *Diglossa mersa.* It seems to belong to the family *Oxytelidae.*——33. Notes on the economy of *Gyrinus villosus.* By Rev. A. W. Griesbach.——34. Discovery of *Elater crocatus* (Zeigler) announced. By Thomas Desvignés.—— 35. Description of two Scarabaei (*Propomacrus Arbaces,* Newman, and *Scarabaeus Croesus*) in the cabinet of Samuel Hanson, Esq. M. E. S. &c. By Edward Newman. With an ill-engraved and uncoloured plate.——36. Verses.——37. Notes on Tenthredinidæ. By Edward Newman. Contains characters of several species, and a new genus Euura allied to *Pristophora* of Stephens proposed.—— 38. Some account of the birds of Godalming. By Waring Kidd and others.——39. Proceedings of the Entomological Club. The proceedings of this body are probably more interesting to the parties immediately concerned than to the public. The numerous contributions received must soon enable them to form a very extensive collection of insects. In a journey by Messrs Walker and W. Christy to the neighbourhood of North Cape, six different kinds of butterflies were found in that high latitude. Varieties of *Hipparchia ligea* and *blandina* were so intermixed, that it was impossible to separate them, and it is hence inferred that these constitute but a single species. In the present state of our knowledge, it would perhaps be safer to conclude, that when two closely allied species occur in profusion in the same locality, a sexual union sometimes takes place between them, and hybrids are produced partaking of the attributes of both. We know that *Pontia napi* and *P. rapae* have been observed united, and also *H. hyperanthus* to *H. Janira*—species not so intimately related to each other as *H. ligea* and *H. blandina.*—— 40. Proceedings of the Entomological Society of France.——41. Proceedings of the Entomological Society of London.——42. List of Entomological works.

Companion to the Botanical Magazine. By Sir W. J. Hooker, Professor of Bot. in the University of Glasgow. Parts xvii. xviii. xix. xx. (Continued from page 404)

These numbers are wholly devoted to a biographical account of Mr Douglas, and agreeably to our promise (No. IV. p. 404), we present to our readers a notice of the interesting Memoir of this lamented Naturalist, and regret that our necessarily circumscribed limits prevent going into more ample details of a zeal, unsurpassed perhaps in the cause of botanical science, and of dangers encountered with the most fearless intrepidity, and which at last proved unhappily fatal.

Mr Douglas was born at Scone, near Perth, in 1799, of humble but respectable parents. At a very early age he was sent to school, but seems to have had less relish for book-learning than for fishing and bird-nesting and collecting flowers,—a taste which soon ripened into a fondness for the pursuits and objects of Natural History, generally, but in particular of botany. This led to his employment in the gardens of the Earl of Mansfield, at that time under the superintendence of Mr Beattie, to whom he was bound as an apprentice for seven years. In this situation he devoted his whole heart and mind to the attainment of a thorough knowledge of his business, and acquired that decided taste for botanical pursuits which he so ardently followed in after life. From the gardens at Scone he was removed to those of Sir Robert Preston, at Valleyfield, near Culross, where his botanical taste was much improved by the rich collection of exotic plants cultivated there, and by the contents of a valuable botanical library to which he was kindly permitted access. After remaining two years at Valleyfield, he succeeded in gaining admission to the Botanical Garden at Glasgow, where he applied to his professional duties with so great a diligence and success as to gain the friendship of all who knew him, and particularly of Dr Hooker. He was in consequence recommended by that gentleman to the London Horticultural Society, as a botanical collector; and in 1823 was dispatched to the United States, where he procured many fine plants, and enriched the Society's collection of fruit-trees. On his return, he was sent in the following year " to explore the botanical riches of the country in North-West America, adjoining the Columbia river, and southward towards California. After a long and tedious voyage of above eight months, during which he omitted no opportunity of gratifying his taste for objects of natural history both at sea and the various coasts and islands on which he occasionally landed, he reached the Columbia river on the 7th of April 1834, and lost no time in commencing his researches. Fortunately for the interests of botanical science, Mr Douglas, while exploring these remote and hitherto untrodden regions, kept a regular journal of his proceedings, and from this, as given in the Memoir, we shall now present our readers with some interesting extracts.

" I may mention some birds of this country (vicinity of the Columbia) that came under my notice; and first, the *silver-headed eagle, (Aquila leucocephala* of Richardson and Swainson?) a grand creature, abundant wherever there are rivers containing fish. These birds perch on dead trees and stumps overhanging the water, and are invariably found near cascades and falls; they are wary and difficult to be killed, although other species of eagle do sometimes overcome them. The voice is a shrill whistle: they build their nests in large trees, not confining themselves to dead trunks, and appear always to select the most conspicuous situations, such as the tops of steep rocks, points and necks of land, where they may be almost certainly looked for. Two, three, and even four young ones are hatched at a time, which keep the nest, and continue on the tree much longer than most birds, seldom quitting the vicinity of the place where they were reared. The colour of the first plumage is a brownish-black, which in the first spring assumes a mottled grey, lighter on the head and tail; the second year, these parts become perfectly white and the body black. I killed one of these birds flying last July; it was a fine large male, and was perched on a stump close to the village of Cockqua, one of the principal chiefs of the Chenook nation. This tribe was at war with the Clatsops, and some other Indians, and many were the feats of strength and dexterity which they performed in order to show their superior powers, among which were hitting a mark with a bow and arrow, and a gun. One individual passed the arrows through a small hoop of grass six inches in diameter, thrown up into the air by another person, and then with his rifle struck a mark one hundred and ten yards distant, exclaiming that none of King George's chiefs could do the like any more than chaunt the death-song and dance war-dances with him. On this bravado, deeming it a good opportunity to show myself a fair marksman, the poor *silver-headed eagle* was made to pay for it. I lifted my gun, which was charged with swan-shot, walked to within forty-five yards of the bird, and throwing a stone to raise him, brought him down when flying. This had the desired effect; many of the natives, who never think of the possibility of shooting an object in motion, laid their hands on their mouths in token of fear, a common gesture with them. The fellow, however, still shewing himself inclined to maintain his superiority, gave me a shot at his hat, which he threw up himself, when my shot carried away all the crown, leaving nothing but the brim. My fame was hereupon sounded through the whole country, and a high value attached to my gun. Ever since, I have found it of the utmost importance to bring down a bird flying when I go near any of their lodges, at the same time taking care to make it appear as a little matter, not done on purpose to be observed. With regard to the hat in question, I may mention that it was woven of the roots of *Helonias tenax*, which the Indians of the Columbia call *Quip-Quip;* and on my observing the tissue with attention, Cockqua promised that his little girl, twelve years of age, should make me three or four after the European shape, giving me at the same time his own hat, and a large collection of baskets, cups, and pouches of the same material, for which I paid in tobacco, knives, nails, and gun-flints. The roots of *Cyperus* and *Thuja* are also used for the same purpose. When returning last summer from the Grand Rapids, I saw one of these *silver-headed eagles* take a small sturgeon out of the water, and as he was soaring over my head, I lifted my gun and brought him down. The claws of the bird were so firmly clenched through the cartilaginous substance of the fish's back, that he would not let go, till I introduced a needle into the vertebrae of his neck. The sturgeon measured fifteen inches long, and weighed four pounds."—No. cxix. pp. 98, 99.

"On Thursday 23d (March 1826,) we proceeded on our voyage with a strong westerly wind, which enabled us to hoist a sail, and reached the lower part of the great Falls at dusk, where we camped in a small cove under a shelving rock. Fortunately the night was fine, and the moon bright, which was the more agreeable, as the wind would not allow of our tent being pitched. Here we were placed in a dangerous predicament, from the natives who collected in unusually large numbers, and showed every disposition to be troublesome, because they did not receive so ample a supply of tobacco as they had expected. We were obliged to watch the whole night. Having a few of my small wax tapers still remaining, I lighted one, and sat down to write to Mr Murray of Glasgow, and to arrange in paper some mosses that I had collected the preceding evening. Daylight was a most gladsome sight, as may be imagined, after spending the hours of darkness surrounded by at least 450 savages, whose manners announced anything but amicable feelings towards us. As no one in the brigade could converse with them much better than myself, little could be done by persuasion. However, discovering that two of the principal men understood the Chenook language, which I am slightly acquainted with, I found this circumstance of some advantage. After taking a hurried and anxious breakfast on the rocks, we proceeded several miles up the river, and in the afternoon made the portage over the great Falls, where Mr M'Leod was apprized that the Indians were lying in wait with the intention of attacking us and pillaging the boat. This warning proved too correct. No sooner had they received the customary present of tobacco, than they became desirous of compelling us to encamp for the night, that they might the better effect their purpose. The first symptom of hostile intentions which we observed, was their cunning trick of sprinkling water on the gun-barrels of our party, and when the boats were ordered to be put into the water, they would not allow it to be done. As Mr M'L. was laying his hand on the shoulders of one native to push him back, another fellow immediately drew from his quiver a bow and a handful of arrows, and presented it at Mr M'L. My position at the time, at the outside of the crowd, enabling me to perceive this manœuvre, and no time being to be lost, I instantly slipped the cover off my gun, which was fortunately loaded with buck-shot, and presenting it at him, I invited him to discharge his arrow, when I would return it with my own weapon. Just at this moment, a chief of the Kyemuse, and three of his young men, who are the terror of all the other tribes west of the mountains, and the staunch friends of the white people (as they call us) stepped in among the party, and settled the affair without any further trouble." P. 104—105.

"The weather being pleasant, I begun preparing for my great excursion to the mountains, and sent accordingly to the Indian camp to bid my guide be ready by sunrise. During the night I was annoyed by the visit of a herd of rats, which devoured every particle of seed I had collected, eat clean through a bundle of dried plants, and carried off my soap-brush and razor! As one was taking away my inkstand, which I had been using shortly before, and which lay close to my pillow, I raised my gun, which, with my faithful dog, always is placed under my blanket by my side, with the muzzle to my feet, and hastily gave him the contents. When I saw how large and strong a creature this rat was, I ceased to wonder at the exploits of the herd in depriving me of my property. The body and tail together measured a foot and a half, the back is brown, the belly white; while the tail and enormous ears are each three-quarters of an inch long, with whiskers three inches long, and jet black. Unfortunately the specimen was spoiled by the size of the shot, which in my haste to secure the animal and recover my ink-stand, I did not take time to change; but a female of the same sort venturing to return some hours after, I handed it a smaller shot, which did not destroy the skin. It was in all respects like the other, except being a little smaller."—P. 115.

"About an hour's walk from my camp, (in North California,) I met an Indian, who, on perceiving me, instantly strung his bow, placed on his left arm a sleeve of racoon skin, and stood on the defensive. Being quite satisfied that this conduct was prompted by fear, and not by hostile intentions, the poor fellow having probably never seen such a being as myself before, I laid my gun at my feet on the ground, and waved my hand for him to come to me, which he did slowly and with great caution. I then made him place his bow and quiver of arrows beside my gun, and striking a light, gave him a smoke out of my own pipe, and a present of a few beads. With my pencil I made a rough sketch of the *Cone* and *Pine-tree* which I wanted to obtain, and drew his attention to it, when he instantly pointed to the hills fifteen or twenty miles distant towards the south; and when I expressed my intention of going thither, cheerfully set about accompanying me. At mid-day I reached my long-wished-for pines, and lost no time in examining them, and endeavouring to collect specimens and seeds. New and strange things seldom fail to make strong impressions, and are therefore frequently over-rated; so that lest I should never again see my friends in England to inform them verbally of this most beautiful and immensely grand tree, I shall here state the dimensions of the largest I could find among several that had been blown down by the wind. At three feet from the ground its circumference is 57 feet 9 inches; at one hundred and thirty-four feet, 17 feet 5 inches; the extreme length 245 feet. The trunks are uncommonly straight, and the bark remarkably smooth for such large timber, of a whitish or light-brown colour, and yielding a great quantity of bright amber gum. The tallest stems are generally unbranched for two-thirds of the height of the tree; the branches rather pendulous, with cones hanging from their points like sugar-loaves in a grocer's shop. These cones, however, are seen only on the loftiest trees, and the putting myself in possession of three of them, (all I could obtain,) nearly brought my life to a close. As it was impossible either to climb the tree or hew it down, I endeavoured to knock off the cones by firing at them with ball, when the report of my gun brought eight Indians, all of them painted with red earth, armed with bows, arrows, bone-tipped spears, and flint-knives. They appeared any thing but friendly. I endeavoured to explain to them what I wanted, and they seemed satisfied, and sat down to smoke; but presently I perceived one of them string his bow, and another sharpen his flint-knife with a pair of wooden pincers, and suspend it on the wrist of the right hand. Farther testimony of their intention was unnecessary. To save myself by flight was impossible, so without hesitation I stepped back about five paces, cocked my gun, drew one of the pistols out of my belt, and holding it in my left hand, and the gun in my right, shewed myself determined to fight for my life. As much as possible I endeavoured to preserve my coolness; and thus we stood looking at one another without making any movement or uttering a word for perhaps ten minutes, when at last one who seemed the leader gave a sign that they wished for some tobacco: this I signified they should have if they fetched me a quantity of cones. They went off immediately in search of them; and no sooner were they all out of sight, than I picked up my three cones and some twigs of the trees, and made the quickest possible retreat, hurrying back to my camp, which I reached before dusk. Of my three cones, one measures 14½ inches, and the two others are respectively half an inch and an inch shorter, all full of fine seed." —No. cxx. p. 130.

On the 20th of March 1827, Mr Douglas started from the Columbia for England, by way of Hudson's Bay, traversing in his route the Rocky Mountains, the "Grand Dividing Ridge" of the mighty Continent of North America, at the height of 16,000 or 17,000 feet above the level of the sea. At the Company's settlements he had the happiness to meet Sir J. Franklin, Dr Richardson, and Mr Drummond, and arrived in England on the 11th of September. About the beginning of October 1829, he again set out, under the patronage, partly of the Horticultural Society, and partly of the Government, for North America, and arrived at the Columbia on the 3d of June 1830. Our limits will not permit us to follow him in his important botanical researches, and in perilous incidents which would have shaken the courage of the most stout-hearted. Suffice it to say, that after having again visited North California, he made an excursion to the Sandwich Islands. One or two short extracts must close this notice. While in California he says,—

"Early as was my arrival on this coast (Dec. 22,) spring had already commenced. The first plant I took in my hand was *Ribes speciosum*, Pursh (Bot. Mag. t. 3530; Bot. Reg. t 1557,) remarkable for the length and crimson splendour of its stamens; a flower not surpassed in beauty by the finest *Fuchsia*; and for the original discovery of which we are indebted to the good Mr Arch. Menzies in 1779. The same day I added to my list *Nemophile insignis* (Bot. Reg. t. 1713; Bot. Mag. t. 3485,) a humble but lovely plant, the harbinger of Californian spring, which forms, as it were, a carpet of the tenderest azure hue. What a relief does this charming flower afford to the eye from the effect of the sun's reflection on the micaceous sand where it grows."—P. 149.

In the island of Hawaii, one of the Sandwich group, he "visited the summit of *Mouna Roa*, the *Big* or *Long Mountain*, which afforded me inexpressible delight. This mountain, with an elevation of 13,517 feet, is one of the most interesting in the world. The journey (to the top) took me seventeen days. On the summit is a volcano, nearly 24 miles in circumference, and at present in terrific activity. You must not confound this with the one situated on the flanks of Mouna Roa, and spoken of by the missionaries and Lord Byron, and which I visited also. It is difficult to attempt describing such an immense place. The spectator is lost in terror and admiration at beholding an enormous sunken pit, (for it differs from all our notions of volcanoes, as possessing cone-shaped summits with terminal openings,) five miles square of which is a lake of liquid fire, in a state of ebullition, sometimes tranquil, at other times rolling its blazing waves with furious agitation, and casting them upwards in columns from 30 to 170 feet. In some places, the hardened lava assumes the form of Gothic arches in a colossal building, piled one above another in terrific magnificence, through and among which the fiery fluid forces it way in a current that proceeds three miles and a quarter per hour, or loses itself in fathomless chasms at the bottom of the cauldron. This volcano is 1272 feet deep; I mean down to the surface of the fire; its chasms and caverns can never be measured. I visited also the volcano of Thiranea, the lateral volcano of Mouna Roa; it is nearly 9 miles round, 1157 feet deep, and is likewise in a state of terrific activity. I go immediately to Hawaii to work in these mountains. May God grant me a safe return to England." P. 161.

Alas! to England he was destined never to return. After surmounting innumerable dangers with almost unexampled courage and success, he fell a victim at last to one of those accidents, improperly so called, which a mysterious Providence for wise purposes sometimes permits to befal its creatures. His death took place in the Island of Hawaii, on the road to Hido, the residence of the missionaries; and the particulars of the sad event are given in a letter from these gentlemen. It would appear that he lost his way; and his body was found in a pit excavated for the purpose of entrapping wild cattle, and into which a bullock had previously fallen. The face was covered with dirt; the hair filled with blood and dust, the head dreadfully cut, and the limbs mangled and bruised. It was naturally concluded, and the conclusion was confirmed by medical gentlemen who inspected the body, that his death was caused by wounds inflicted on him by the captured bullock.

TRANSACTIONS AND PERIODICALS.—*Foreign.*

Nouveaux Memoires de la Sociélé Imperiale des Naturalistes de Moscow, Tom. iv. (with 13 *plates, and forming the* 10*th vol. of the Collection.)* Moscow, 1835. 4to.

In noticing for the first time the Memoirs of a Society which is likely to be little known to many of our readers, we may mention that the Imperial Society of Naturalists at Moscow has existed for many years, and has published numerous volumes of valuable transactions. Its primary object is to investigate the natural history of Russia, and for this purpose a museum is formed, and almost every year individuals are sent, at the expense of the Society, to examine the most remote and least known portions of the empire. The whole expenses of the Society are defrayed by the Emperor, who presents it with an annual donation of 10,000 R. ass. In addition to this each member contributes yearly 30 R. which forms a sum in reserve. Each member on admission must present to the Society a memoir, or a work known to scientific men. The meetings are held monthly. The memoirs are allowed to be written in Latin, German, French, English, Italian, or Russian.

The volume of Transactions referred to above is almost exclusively devoted to Entomology. The first paper, which occupies 113 pages of the volume, is entitled, "Additamenta Entomologica ad Faunam Russicam," and contains the descriptions of no fewer than 283 *new* species of Coleoptera. These were collected in remote provinces of the empire by Szovitz, an individual employed principally to examine the botany; but who devoted his leisure hours to what has been called its sister science. This person having been carried off by fever while prosecuting his researches, M. Faldermann was employed to render his entomological discoveries available to the public. While engaged in this undertaking, another collector, named Ménétriés, returned from the Asiatic provinces with numerous acquisitions, and it was deemed advisable that the discoveries of both should appear together. The result is the highly important addition to the number of known species mentioned above. Most of them have been referred to already existing genera, but in four instances, M. Faldermann found it necessary to establish new genera. These he has named *Platynomerus*, *Microderes*, *Tanyproctus*, and *Pachymerus*. The former of these is nearly allied to Pristonychus, the second to Platymetopodis of De Jean; the third contains two lamellicorn insects, and its station is indicated between Melolontha and Scarabaeus; the fourth likewise belongs to the lamellicorn section, and has considerable affinity to Amphicoma. Several of the species are of considerable size and brilliant colours. Such especially is the Carabus Humboldtii, which is equal in size to any of our native species, and has the elytra finely glossed with coppery-red. Thirteen new Cetonias are described and figured, and many of them partake of the lustre and rich colouring which distinguish that beautiful tribe. The brachelytrous species amount to 16. Among the malacodermata, a new species of Lampyris (*L. orientalis* pl. 6, fig. 6, 7), is introduced, so closely resembling our native glow-worm that it might readily be taken for a variety. The eastern insect, however, is distinguishable by being broader, by having the elytra darker and more dilated behind, while there are three distinct ridges along the surface of each. Cicindela has received an accession of five species; Cychrus 1, Carabus 12, Harpalus 11, Cantharis 11, Silpha 6, Onthophagus 12. This paper does not advance beyond the section Heteromera, but the remaining tribes have to appear in a subsequent fasciculus. The plates, it may be added, are in general well executed, but in no instance are dissections given. Magnified representations of the oral organs when new genera are proposed, as in this case, should be regarded as quite indispensable.——II.—*Description de quelques Coleopteres recueillis dans un voyage au Caucase et dans les provinces transcaucasiennes Russes, en* 1834 et 1835. Par T. Victor. This paper is chiefly occupied with descriptions of those minute and singularly formed insects composing the family *Pselaphidæ*. Many new localities are cited for species previously known, and a considerable number described and figured, which are considered new. We are likewise made acquainted with a few minute coleoptera belonging to other families, which do not appear to have been previously noticed by entomologists——III.—*Lettre sur le genre Xeranthemum*. Par F. E. L. Fischer, et C. A. Meyer. The object of this paper is to elucidate the structure and history of various species of this interesting tribe of plants. Some new kinds are noticed, and useful observations advanced on the synonomy of those formerly described. It is accompanied with two lithographic plates, illustrating the structure of the flowers and pappus.

Bulletin de la Société Imperial des Naturalistes de Moscow. Tom ix. Accompagné de ix. Planches. Moscow, 1836. 8vo.

Art. 1. The first 115 pages of this volume, of which we need mention only the principal articles, are occupied with a paper by Dr Besser, entitled " Supplementum ad Synopsin Absynthiorum, tentamen de Abrotanis, dissertationem de Seriphidiis atque de Dranunculis," designed to convey additional information on these subjects, which had previously been treated more at length by the same author.——2. Ueber die erste ursache der unebenheit der festen erdoberflæche.——3. Helices proprie dictæ hucusque in limitibus Imperii Russici observatæ, a Joanne Krynicki. This individual appears to have examined the terrestrial mollusca of Russia with great care, and this communication forms a sequel to others already published by him on the same subject. No fewer than forty-one species are described in this paper very minutely, with their synonyms given at length, and several new species are introduced. In the genus *Helicogena* (Fer.) it is interesting to remark the occurrence of a species well known in more southern regions, viz. *H. pomatia*, which has been found in the wooded and shady districts of Volhynia and Poltava, but it must be accounted very rare. Similar observations apply to *H. nemoralis*, which is likewise classed among the rarer kinds. *H. hortensis* and *H. arbustorum*, well known species in this country, have special localities assigned to them, a proof that they are by no means generally distributed; the former has been found in Volhynia, the latter in Podolia.——4. Uber Irit und Osmit, zuei neue mineralien; von R. Hermann. Discovery of two new minerals, named Iridium and Osmium, among the sandy residuum left after the extraction of platina.——5. Libellululinarum species novæ, quas inter Wolgam fluvium et montes Uralenses observavit, Dr Edward Eversmann. This notice comprises descriptions of four new species of Libellula, two of Æshna and two of Agrion.——6. Lettre de M. le Conseiller d'Etat et chevalier de Gebler, contenant un rapport d'un voyage dans les hautes montagnes Catouniennes jusqu à la frontiere de la Chine, et description des trois nouvelles espècès de coleopteres. The insects described (and figured) are *Heliophilus hypolithus*, *Clytus Altiacus* and *Chrysomela Kowalewskii*, the latter an elegant species of a rich golden green, with blue ridges on the elytra.——7. Orthoptera duo e montibus catunicis, descripta et icone illustrata, auctore G. Fischer de Waldeim. These insects, which do not seem very dissimilar to other species of *Grillidæ* already described, are named *Œdipa Gebleri* and *Œ. rhodoptera*.——8. Bereicherung zur kafer-kunde des Russischen reiches, Von F. Faldermann. A paper containing descriptions (illustrated by figures) of a considerable number of new coleopterous insects.——9. Quelques mots sur le Caucase par Jean Kaleniczenkow. The writer was induced to visit the district of the Caucasus by observing that every naturalist who had visited it from the time of Pallas, had succeeded in discovering new objects of interest. He set out in 1832, and the above paper gives a slight sketch of his proceedings, it being his intention to give a more ample account at some future time. He refers chiefly to the plants observed in his route. In the district of Isioum he describes the mountains as calcareous, containing fossil shells and belemnites, and they produce many plants entirely foreign to the flora of Kharkov. Beyond them appear the plants belonging to the *Steppes* properly so called, viz. *Dictamnus Fraxinella*, *Statice Gmelini*, *Glycyrrhiza glandulifera* (Kit.) *Artemisia procera*, &c. At Moskovskaia, in the government of the Caucasus, he observed on the sides of hills inclining to the south, and even on their summits, *Xeranthemum Annettæ*; *Polygala major*, *Pimpinella Tragium*, *Rosa pimpinellifolia*, *Vitis vinifera*, &c. Near Jessuntouk, the ridges of the limestone mountains are covered with *Rhus cotinus*, *Aconitum Anthera*, &c. The banks of the impetuous river Podkoumok are fringed with *Hippothoe rhamnoides*, *Tamarix gallica* and *Palisii*, *Salices*, &c. In a valley surrounded on all sides by mountains, from which the Narzanza takes its rise, and where there are thermal baths resorted to by invalids, the most conspicuous and interesting plants are the following: *Betonica grandiflora*, *Polygala Sibirica* (Linn.), *Rhinanthus orientalis*, (Linn.), *Primula amoena*, *Dianthus fragrans*, *Azalia pontica*, (Linn.), *Trollius Caucasicus*, &c.——Beschreibung einiger neuen in Liefland augefunden insecten, Von B. A. GIMMERTHAL. Contains descriptions of several new dipterous and neuropterous insects.

Muller's Archiv für Anatomie, Physiologie, &c. Parts iii. and iv. 1836. (Continued from p. 292.)

Ueber de Metamorphosen des Eies der Fische u. s. w. Von M. RUSCONI. *On the changes which the Ova of Fishes undergo previous to the exclusion of the Embryo.*—In order to continue his observations on this subject, the author repaired to the lake of Como early in July, being assured by the fishermen that both Tench and Bleak deposit their spawn at that period. On the 10th of that month he procured some eggs from a female tench (Cyprinus tinca, Lin.), and placed them in a glazed earthenware vessel filled with water from the lake. They immediately sunk to the bottom, and two or three drops of milt were expressed from a male fish upon them. The eggs were perfectly transparent, and of a greenish yellow colour, like that of olive oil. The milt was of the colour of milk, but much less fluid. In four hours after the fecundation, some of the eggs seemed to have lost their transparency on one side, and others by degrees assumed the same appearance, so that in twenty-four hours they had all become opaque, and their vitality was considered to be extinct. This the author supposed to have arisen from too large a quantity having been laid one upon another in the vessel, and he accordingly took a flat shallow dish, the bottom of which was covered with paper, and filled it with lake water. Some more fecundated ova were then placed in it, so that they did not come in contact with one another. In five hours he again remarked that some had become opaque on one side, and in twenty-four hours the same thing had occurred to nearly all. Some few, however, remained transparent, and these he raised gently from the dish, by means of the paper that was under them, and transferred them to glasses of water for farther observation, placing eight or ten in each; in six or seven hours after this operation, he saw by means of a microscope that the embryo had begun to move, and in twenty-four hours (fifty from the moment of fecundation) the young fishes burst through their envelope. The experiment was again repeated in order to ascertain whether the ova of fishes undergo similar changes to those of the Batrachians (vide Analysis of Müller's Archiv at p. 292,) and half an hour after the eggs had been placed in the dish, he lifted out those which remained transparent, and transferred them to glasses as before. It was now his object to destroy the vitality of some of them at each stage of their development, in order to examine the progress that had been made, at leisure, and for this purpose he dropped into the water four or five drops of a mixture of one part of nitric acid and eight parts of water, which had the desired effect. This was applied at intervals of fifteen minutes during ten hours, and the following are the results obtained: Soon after the application of the milt, the ovum of the tench loses its spherical form, and swells out into the form of a pear. At the point where this swelling begins it is surrounded with a cluster of microscopic globules, which before were spread all over its surface. In half an hour the pear-shaped excrescence is divided into four globules; these in a quarter of an hour more are subdivided into eight, and in a similar period into thirty-two, still remaining clustered together on the top of the egg. In another half hour more globules appear, decreasing in size as they increase in numbers, till at length, from their minuteness, the part of the egg to which they are attached becomes almost as smooth as when they were undeveloped. The embryo fish now becomes discernible in the form of a whitish semitransparent speck, which is the rudiment of the vertebral column. The organization of the skin then gradually proceeds, and the embryo increases in length, coiled round the yolk, till the head becomes perceptible. In forty hours from the fecundation, the embryo tench first gave signs of motion, and at most, twelve hours later, it had freed itself from the skin of the egg. The fish is then two lines in length, and the blood has already acquired its natural colour. For some hours after leaving the egg, the young fry appear stupified; they lie on their sides and are unable to swim, until the swimming bladder is developed, when they immediately assume their proper position and their natural activity. The intestines are not fully developed until seven days after leaving the egg, when they begin to feed voraciously, and exclusively upon animal substances. The fry of the bleak, on the contrary, will only eat vegetable matter, at least during this early period of their existence. The temperature of the room in which these experiments were carried on, ranged from 72° to 77° Fahrenheit. The ova of the bleak are larger than those of the tench, and are for that reason preferable for the purposes of observation, besides being more easily procured. When they had reached the point at which the globules disappear, their vitality was no longer destroyed by the acid before-mentioned; but they were then placed upon a piece of black cloth, or more frequently on a plate of polished silver in a glass of water, and the changes they underwent examined by means of a single lens. The author afterwards had an opportunity of watching a large shoal of Cyprinus Gobio in the act of spawning; he took up three or four pebbles upon which about a dozen eggs were deposited, and placed them in an earthenware vessel in his room, and paid no farther attention to them. About eight or ten days after, he observed four young fish swimming about with vigour, which were so transparent as not to be easily seen except in a dark-coloured vessel, and he appears to have met with none of the difficulties in rearing fish from the ova, which Herr von Bäer states to have so much impeded his observation.

These numbers also contain a paper on the Spermatic Entozoa of vertebrate animals by Professor Wagner, and one on those of the invertebrata, by Dr Siebold of Danzig. The latter author also has one on the anatomy of the Asterias; and there is likewise the first part of a paper on the effects produced by acetate of lead on the organism of animals (dogs and rabbits), by Dr C. G. Mitscherlich.

Linnea—Ein Journal für die Botanik, u. s. w. Halle, 1835–6.

THE most interesting papers in the latter numbers of this periodical are as follow:—Continuation of the catalogue of Mexican plants.—List of South American grasses by E. Poeppig.—Monograph of the genus Paulia.—Catalogue of the Acotyledonous plants of Southern Africa, intended to include all that have been discovered since the publication of Ehrenberg's Flora of that country, part 1st, Filices.—Continuation of the list of plants discovered in the expedition of Romanzoff, with the addition of those collected by Ehrenberg in Hispaniola.—Contributions towards the history of Botany in the 13th century.—Upon the willows in the Hortus Hostianus, and the Dendrotheca Bohemica.

Annales des Sciences Naturelles. Zoologie, MM. AUDOUIN et MILNE-EDWARDS. *Botanique,* MM. AD. BRONGNIART et GUILLEMIN. Crochard and Co. Paris, Juillet, Aout, 1836. (Continued from page 489.)

1. *Zoology.*

THE July Number is occupied with MILNE-EDWARDS' "*Recherches anatomiques, physiologiques et zoologiques sur les Eschares,*" a paper which embraces a review of every thing which has been written on the family, a detail of the author's original inquiries, which are very interesting and complete, and a description, illustrated with excellent figures, of all the species known to this date. We shall have occasion to make ample use of this essay in the "History of British Zoophytes" publishing in this Magazine; but we desire to mention at present, that Milne-Edwards disputes the accuracy of the view adopted by us, of the inorganic nature of the polype-cells and of the polypidom, contending that these are formed much as bone is in the superior animals, and continue to be in connection with, and under the control of, the living parts. The cell, he says, in which the polype retreats as into a shell, is an integral part of the animal, in which it conceals itself just as the hedgehog withdraws after a manner into the spinous skin of its back. The cell is not a calcareous crust which is moulded on the surface of the body of the polype, but a portion of its general tegumentary membrane or skin, which by a molecular deposition of earthy matter in the meshes of its tissue, hardens as the cartilages of the superior animals harden themselves, without ceasing to be the seat of a nutritive movement. The facts on which Milne-Edwards grounds this conclusion, we are willing to admit appear conclusive; and we have only to guard against its general applicability, for the explanation refers only to the polypidoms of which we have designated "ascidian polypes."

The analysis of the proceedings of the "Academie des Sciences" embraces a continuation of the interminable notices of the Orang-Outang, and its verisimilitudes to man, with which GEOFFROY SAINT-HILAIRE, from sitting to sitting, entertains the academy; LEON DUFOUR'S account of the parasite of the *Andrena aterrima* already mentioned by us, p. 295; a letter from ALEX. BRONGNIART on Ehrenberg's discovery of fossil Entomostraca and other infusory animalcules; a notice of a shower of Frogs which fell in August 1804, near Toulouse; DONNE on the action of pus upon blood newly drawn from the veins; and a long and curious note upon the Guacharo (*Steatornis Caripensis,* Humb.) of the Cavern of Caripe.

The contents of the number for August are, "*Memoire sur l'émigration du Puceron du Pêcher* (Aphis persicæ,) *et sur les charactères et l'anatomie de cette* *espèce, par* Ch. Morren,"—which is extremely interesting and well illustrated "*Note sur une nouvelle espèce d'Actinie, par* M. Duges." The species is closely allied to, if it be not identical with, the *Actinia maculata*, described by Dr Coldstream in the Edinburgh New Philosophical Journal, ix. p. 236: *Extrait d'un mémoire sur la place que doit occuper dans le systeme ornithologique le genre Chionis, par* M. de Blainville. The memoir concludes thus—We believe it then to be demonstrated, that with the Gallinaceæ (even embracing in that family the pigeons, though erroneously as we think,) this genus has the least relationship, although the alary system is very nearly the same in both, for in every other respect there is a complete dissimilarity, as well in the organization as in the manners and habits. Between the Waders and the Palmipedes the choice is more difficult, because these two orders glide into one another at almost every point. However, it is with the Cursores among the Waders, that we find the greatest resemblance to Chionis, and among them this is nearest affined to the oyster-catcher or Hæmatopus, whose organization and economy is very similar. In these two genera, 1*st*, the number of vertebræ is the same, 15—6—14—8; 2*d*, the number and shape of the ribs are the same; 3*d*, the sternum, of the same general figure, has two sub-equal emarginations, the superior a little larger than the inferior; 4*th*, the intestinal canal of both has three cœca, of which the two terminal are moderately sized, and the median very small; 5*th*, the stomach is in both formed of a very small gizzard without a crop; 6*th*, the tail is short, and composed of six pairs of equal feathers; 7*th*, the wings, formed of ten quills "à la main," are acute; 8*th*, the legs are little raised, and naked only towards the talons; 9*th*, the tarsi, not compressed, are equally reticulated before and behind; 10*th*, the sole of the toes is flattened in a manner that they appear margined; 11*th*, both birds are walkers and runners; 12*th*, they both dwell on the sea shores, where, 13*th*, they seek their food, consisting of shell-fish and perhaps of dead animals. It is then near Hæmatopus that Chionis ought to stand, although the figure of the beak is very different, but now where is the zoologist who is ignorant that the consideration of that part is of little importance in deciding the natural affinities of birds?——*Extrait des Recherches sur la marche de l'ossification dans le sternum des oiseaux, pour faire suite aux travaux de MM. Cuvier et Geoffroy St Hilaire, par* M. F. Lherminier.

In the "Analysis" of the month there is an abstract of the following papers read before the Academy: *Lettre de* M. Roulin *sur l'existence du Guacharo dans la province de Bagota.*——*Education des vers à soie.*——*Reflections sur l'Heteradelpline, par* Geoffroy St Hilaire.——*Gras observations relatives à* l'Acarus scabiei.——*Lettre de* M. Kaup *sur la tête fossile du* Dinotherium giganteum.——*Revision de la famille des Anolis, par* M. Cocteau. M. C. D'Orbigny *sur des ossemens fossiles des environs de Paris.*

2. *Botany.*

July. *Observations sur les Biforines, organes nouveaux situés entre les vésicules du tissu cellulaire des feuilles dans un certain nombre d'espèces végétales appartenant à la famille des Aroïdées, par* M. Turpin. A most important and beautiful essay.——C. Montagne *sur les Plantes cryptogames récemment découvertes en France.* These notices are very similar to those with which Mr Berkeley favours British botanists through the medium of this Magazine.—Labiatæ orientales herbarii Montbretiani, seu Labiatarum species novæ vel minus cognitæ quas in Syriâ et Asiâ minore collegerunt Gustavus Coquebert de Montbret et Aucher-Eloy. Ex. speciminibus herbarii Montbretiani descripsit G. Bentham.—Plantarum Mongholico Chinensium Decas prima; auctore Al. Bunge.

August. *Remarques sur les affinités du genre* Heliwingia *et établissement de la famille des Helwingiacées, par* M. J. Decaisne.——Flora Japonica, auct. F. de Siebold et Zuccarini. A review of the two first fasciculi.——*Observations sur le genre Galium et quelques genres voisins, par* J. E. Tausch. The author divides Galium into two sections, thus: * *Eugalium.* Flores anthesi coætanei seu superiores primores. ** *Rubeola.* Flores anthesi succedanei, ab imo versus apicem progredientes. The division is an interesting one, and possesses the advantage over those in common use of indicating an important difference in the habits of the species. We should like to see some of our young and rising botanists engaged in a Monograph of our British Galia.——*Recherches sur les caractères des* Gagea *et sur la place que ce genre doit occuper dans les familles naturelles, par* M. Bernhardi.——Flora Germanica exsiccata, curante L. Reichembach. A review.——Annotationes botanicæ ex indice seminum hort. academici Gottingensis, auct. Schrader, excerptæ: ex indice seminum horti bot. Vratislaviensis, auct. Nees ab Esenbeck et Schauer, excerptæ: e delectu seminum horti botanici Hamburgensis, auct. Lehman, excerptæ.——*Note sur les* Euphorbia platyphyllos, micrantha *et* stricta, *par* M. Hochstetter.——*Champignons d'Italie, principalement les espèces comestibles, veneneuses, ou suspectes, décrites et accompagnées de planches, par le professeur* D. Viviani. A review.——Duriæi iter Asturicum botanicum, anno 1835 susceptum, auctore J. Gay.

INTELLIGENCE.

BOTANICAL.

Aspidium dumetorum.—A species first proposed by our late President in the 4th volume of the English Flora. This is made up of two plants, the one from Cromford Moor, being a dwarf state of *A. dilatatum*, and the other from Ravelston Wood, near Edinburgh, having the segments of the frond abruptly truncate, and the habit, at first sight, altogether peculiar; but an inspection of the original specimens in the Smithian herbarium proves it to be nothing more than an accidental variety of the same species, namely, *Aspidium dilatatum*, arising from disease, which is shown by the sudden termination of the costal, and by the partial decay of the other segments. Specimens of the more ordinary state of *A. dilatatum*, gathered at the same time and from the same locality, are similarly affected, but in a less degree. The distinctions derived from the fructification in the English Flora are altogether fallacious, and are partly dependent on the age of the frond, and partly on that of the individual plant. It is clear, therefore, that the *Aspidium dumetorum* must be erased from the list of species. —Don. Trans. Linn. Soc. Vol. xvii. Part iii.

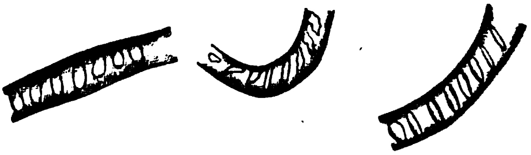
Asplenium Filix Fæmina.—There are two very marked varieties of this plant; the one with broader segments of a dark-green, and with the stipes and rachis of a pale-purple hue; the other, and that the commonest, with the segments of a more delicate texture, and the whole frond of a pale-green. The latter variety varies much in size, according to soil and situation; in damp shady places it becomes the *Filix fæmina* of English botany, and in more open exposed situations the *irriguum*; but neither of these states is entitled to be regarded as a distinct form.—Don. Trans. Linn. Soc. Vol. xvii. Part iii.

Pilularia.—In the last Number of the Magazine of Zoology and Botany, there are some observations regarding Pilularia globulifera; the author of them states the absence of spiral vessels, and does not mention the occurrence of vessels of any kind in the fibrous root of the plant. By careful and repeated examination of the roots, slender creeping stem and leaves of Pilularia, I have detected in each one of these parts a central fasciculus of ducts mixed with *spiral vessels*, and after many attempts, I have succeeded in unrolling the spiral fibre of the latter. This was effected by tearing the parts asunder by means of fine needle points. It is necessary to do this in a drop of water and under a high power of the microscope. Moreover, the parts must be previously macerated in water during a considerable length of time.

The presence of spiral vessels will thus strongly support Dr Lloyd's opinion, viz. that Pilularia deserves to hold a higher rank in the vegetable creation than has been supposed hitherto. With regard to Dr L.'s concluding remarks on the circulation in Pilularia, they are not strictly in accordance with the opinions of modern physiologists regarding the functions of spiral vessels (and ducts), and for this, Lindley's Introduction to Botany, pp. 249, 250, may be consulted.—George Dickie.

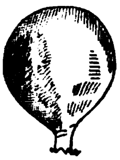
Chara.—The globules of Chara contain filaments which with a low power of the microscope appear transversely undulated. With a plano-convex lens of very high power, I have observed that the filaments consists of transparent tubes, containing in their interior numerous oval, and in some cases irregularly-shaped bodies, the greatest diameter of which corresponds to the short diameter of the containing tube. The bodies generally present the appearance of rings, having no apparent connection with the walls of the case which contains them. In many instances they are crowded together, and irregular in shape; in others they are oval, and placed at equal distances. The fecula which I have seen in the globules seems to have no connection whatever with the bodies now mentioned.—George Dickie.

Fig. 1 represents portions of different filaments very highly magnified.



Jungermannia.—In the axillæ of the leaves of Jungermannia pusilla, numerous small bodies frequently occur (anthers of some writers.) They are of a white colour, and consist of a reticulated membrane; each is supported on a short footstalk. On rupturing these bodies, numerous transparent particles issue forth; the resemblance of these latter to fecula is very apparent, and on the application of iodine they become blue. It occurred to me that the bodies now mentioned might be perhaps one way, by which Jung. pusilla is propagated. I therefore placed some of them in circumstances which appeared to me to be favourable to germination, but after a lapse of several weeks, they had undergone no alteration. Their true nature, therefore, still remains uncertain.—George Dickie.

Fig. 2 represents one of the bodies highly magnified.



MISCELLANEOUS.

Botanical Society of London.—November 17, J. E. Gray, Esq. F. R. S. in the Chair.—A meeting of this Society took place at their new rooms, 11, John Street, Adelphi. Many donations of books and plants were announced, and thanks ordered to be returned. The laws as again revised, were submitted previous to their being printed, and distributed to the members, and it was understood they were to be confirmed at the anniversary meeting on the 29th November next, when also the other officers will be appointed. A memoir was then read by A. Irvine, Esq. of Croydon, Surrey, on the importance of local botany. He stated that Mexico and the regions of the Andes are known to contain 6000 species, of which not 12 in number are found in Europe. He stated that 1500 species of flowering plants are to be found wild in Britain, of which about two-thirds are to be found within a circle of twenty-five miles round London, as mentioned in *Cooper's Flora Metropolitana.* Mr Irvine has himself discovered 670 species within two miles of Hampstead, Middlesex. Within an equal distance of Croydon he has found no less than 900 different species, and he has reason to suppose many more grow within the same limits. The species of vascular plants found in Great Britain comprise nearly all those growing in Lapland and Sweden, three-fourths of those growing in Germany, of which that country is estimated to contain about 2000 different species. The British plants comprise about three-fifths of those found in France, which amount to about 4000 ; the southern provinces bordering on the Mediterranean making a great addition to the number of the species. The Flora of the presidency of Madras, as hitherto published, contains 2800 species, but the whole of Hindostan is known to contain 8000.

Mr Irvine made some observations on the state of chemical botany, and stated that results of the utmost importance to the welfare of mankind, may be expected from further research into the dietetic and medicinal properties of plants. The meeting adjourned till 29th.

Nov. 29. J. E. Gray, Esq. F. R. S., in the Chair.—The first general meeting of this society took place on the 29th November 1836, the anniversary of the birth day of the illustrious English botanist, " *John Ray,*" when the laws were confirmed and ordered to be distributed, and the officers elected. The officers for the year 1837 are as follows :—

John Edward Gray, Esq. F. R. S., *President.*
Dr Macreight, F. L. S. ; Charles Johnston, Esq. *Vice-Presidents.*
John Reynolds, Esq. *Treasurer.*
Daniel Cooper, Esq. *Curator.*
W. M. Chatterly, Esq. *Secretary.*

Other Members of the Council.

Edward Charlesworth, Esq. F. G. S.
George E. Dennes, Esq.
Joseph Freeman, Esq.
Dr M'Intyre, F. L. S.
H. A. Meeson, Esq.
Dr James Mitchell, F. G. S.
Dr Bell Salter.
C. E. Sowerby, Esq. A. L. S.
W. H. White, Esq. M. M. S.

The president then addressed the meeting, congratulating them upon the flourishing condition of the society, and also of botanical science, especially in this country, and enumerated the advantages likely to proceed from the establishment of this society and *Botanic Garden* in the metropolis. Dr Macreight suggested the propriety of printing the address, which contained so much that was new, important, and interesting; the matter was referred to the Council. A vote of thanks was proposed, and carried unanimously, to the President for his able and kind address. The meeting then adjourned untill December 1st.

Dec. 1st.—J. E. Gray, Esq. F. R. S., President, in the Chair.—The names of the visitors having been read, several donations to the Library, Herbarium, and Museum were announced, and thanks ordered to be returned. A paper was then read by H. A. Meeson, Esq. on the formation of wood, in which he advocated the theory of Du Petit Thouars. Some discussion having taken place, the President dissolved the meeting.

Dec. 15th.—J. E. Gray, Esq. F. R. S., President, in the Chair.—The minutes of the last meeting having been read and confirmed, and the names of the visitors introduced announced, the secretary read the list of donations to the Library, Herbarium, &c.

A paper was read by the Secretary from Dr Macintyre, F. L. S. on the Flora of Warley in Essex, the summary of which was, 10 genera, and 23 species of ferns were found in that vicinity: that the monocotyledonous plants amounted to 65 genera and 136 species: dicotyledonous to 265 genera and 542 species, exclusive of the *Salices*. Some localities of the rarer plants about Dover, Kent, as stated in Watson's New Botanist's Guide, were confirmed by Mr G. E. Dennes. After some discussion had taken place, the president announced the next meeting of this Society would take place on 5th January 1837, when a paper would be read by the curator, Daniel Cooper, Esq. on the distribution of the localities of plants in *Battersea Fields*, giving a map or plan indicative of their particular localities.

Jan. 5.—J. E. Gray, Esq. President in the Chair. After the visitors' names and the minutes of last meeting had been read and confirmed, and the donations announced, a Memoir was read by the Curator, Daniel Cooper, Esq on the distribution of plants in a well known and rich locality in the neighbourhood of London, "*Battersea Fields*," accompanied with a map or plan exhibiting (on the scale of 2 feet to a mile) the particular localities of the rarer species. To this gentleman practical botanists are indebted for this novel idea, which will prove of essential service to the Field Botanist. Mr Cooper stated at the conclusion of his paper, that when the various railroads now in contemplation have been executed, the localities in the neighbourhood of London will in a great measure be overturned and obliterated; and it was his opinion that the Members of the Society should work together in order to arrive at the greatest accuracy, and produce plans similar to that before them, so that at a future period, when railroads and such like public undertakings have demolished our richest localities in the neighbourhood of this extensive metropolis, we shall possess at least a plan to show our descendants that such plants did exist at a stone's throw from London. He also stated that he hoped that the rough sketch now before them, as an example, would be followed up by the Members, so that, in the course of a few seasons, we may possess plans exhibiting the distribution of plants throughout England, Wales, and Scotland, or in whatsoever direction the working members may be called. On the result of the number of species found in this locality, Mr Cooper made the following remarks. Of the 104 natural orders of British Flowering Plants mentioned in the 1st ed. of Lindley's Synopsis, 61 are found in this locality. Of the 503 genera, 214 are here distributed; and lastly, out of the 1500 estimated species, 406 are here found dispersed; thus, in this piece of ground which measures one mile and a half in length, and one mile in breadth, we have more than one half of the British natural orders, as 61 to 104, not quite half the genera, in the ratio of 214 to 503, and rather better than one-fourth the species, in the ratio of 406 to 1.500.

Mr Thomas Hancock then read a memoir " On the more interesting plants which he met with during an excursion with several gentlemen of the British Association as far as Penpool and Blaize Castle (about 8 or 10 miles N. W. of Bristol,) in the early part of September last. These papers having severally called forth some remarks, the meeting separated.

Jan. 19.—W. H. White. Esq. in the Chair. The names of the visitors introduced, and the minutes of the last meeting having been read and confirmed, members were proposed and elected. A continuation of Dr M'Intyre's paper on the plants found about Warley in Essex, having been read and discussed, the chairman stated, that the next meeting would take place on Feb. 2d, when a paper will be read by Joseph Freeman, Esq. " On the importance and practicability of adopting a more systematic method in describing and arranging the species of plants."

Feb. 2.—J. E. Gray, Esq. F. R. S. President in the Chair. Several presents &c. having been announced, and members proposed, and others elected, Mr Joseph Freeman read his paper on " Hints on the importance and practicability of adopting a more systematic method in describing and arranging the species of Plants," which produced much discussion and interest.

Mr G. E. Dennes then read some observations on the plants found about Deal, Walmer, Dover, and Sandwich, Kent, in August and September 1836. Thanks having been ordered to be returned to the above gentleman, the next meeting of the Society was announced for Thursday, Feb. 14 instant.

OBITUARY.

On the 24th January 1837, in Mill Street, Hanover Square, *Joseph Sabine*, Esq. the *Ornithologist*, F. R. S., F. L. S. &c. in his 67th year.

On the 19th December 1836, in Paris, *M. Persoon*, author of Synopsis Plantarum. His valuable Herbarium was sold to the French Government.

INDEX.

'Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin,' analysis of, - 404–12
Acacia lineata, - - 287
Adoxa, 296; Ad. moschatellina, the structure of its flowers, - 259
Agaricus balininus, 509; cochleatus, 495; cossus, 508; cyphelliformis, 511; cinnamomeus 511; erubescens, 508; fusco-purpureus, 508; glaucopus, 43; hæmatophyllus, 507; mastoideus, 42; mitis, 511; pelianthinus, 42; pterigenus, 510; racemosus, 510; rubidus, 43; speciosus, 43; tuberosus, 509; vulgaris, 510; undatus, 509
Alcyonella stagnorum, - 293
Algæ, new British, - - 297
'Algæ Britannicæ,' Hooker's manual of, announced, - 201
Alopecurus fulvus, 141; geniculatus, - - - - 141
America, North, zoology of, - 298
Ammocœtes branchialis, - 201
Anatomy, comparative, its use to the zoologist, - - 14, 15
Animals, estimate of their numbers, 3, 4
Animal, huge marine, - 414
'Annales des Sciences Naturelles,' analysis of, 101; 193; 290; 412; 486; 588
Anodontes, - - 487
Antelope beisa, - - 276
Applegarth, Register of Thermometer kept at, - - 506
Aquila chrysaëtus, digestive organs of, - - - - 129–134
Aquila leucocephala, - 579
'Archiv fur Anatomie, Physiologie, und Wissenschaftliche Medicin,' analysis of, - 196; 292; 586
Arvicolæ, - - 493
Ascidian Polypes, - - 232
Aspidium dumetorum, - 591
Asplenium Felix Fœmina, - 591
Astacus Europeus, - 175
Asteroid Polypes, - - 237
Asteroma veronicæ, - 511
Athalia centifolia, - - 485
Ayrshire, contributions to its Flora, 498

Babington, C. C., Botanical Notes, 136
Baird, W., History of the British Entomostraca, 35–41; 309–333; 514–526
Bee, its length of life, - 57
Begonia Fischeri, 287; sanguinea, 287
Belanger 'Voyage aux Indes Orientales,' reviewed, - 269
Bell's 'History of British Quadrupeds,' noticed, - - 280
Belfast Natural History Society, 308
Bennet, E. T., death of, - 308
Berkeley, M. J., Notices of British Fungi, 42–49; 507–513
Berkeley's, M. J., 'British Fungi,' noticed, - - 401
Berwickshire Naturalist's Club, 502
Bevan, E., on the Honey-Bee community, - - 57–62
Birds, Digestive Organs of, 125–136
Birds, Migratory in 1836, - 494
Birds of Northern India, - 209
Birds, British, Eyton's History of the rare species, noticed, - 400
Bletia patula, - - 287
Blume's 'Rumphia,' noticed, 280
Bog timber of Ireland, - 265
Boisduval's 'Species Général des Lepidopteres' noticed, - 568
Bonaparte, Luc., his 'Iconographia della Fauna Italica,' reviewed, 82–93
Botany, requisites necessary for the advance of, - - 113–125
Botany British, works on - 107
'Botanical Magazine,' Companion to the, noticed, - 289; 403
Bowman on the longevity of the Yew, 301
Brewster, Sir D., on the Crystalline Lenses of animals, - 206
British Association, Meeting of at Bristol, - 297–306
British Plants, Edinburgh Catalogue of, noticed, - - 398
British Plants, Henslow's Catalogue of, reviewed, - - 393

Briza, nov. sp. ? - - 140
Bufo calamita, - - 294
Buprestis decipiens, - 253
Buteo vulgaris, digestive organs of, 134-6
Buzzard, digestive organs of, 134-6

Callitriche pedunculata, - 136
Calothrix distorta, - - 296
Camel, fossil bones of, - 493
Cameleon cristatus, - 573
‘ Canaries Iles, Histoire Naturelle des,’ noticed, 108 ; reviewed, 470
Caoutchouc, properties of, - 303
Carex Buxbaumii, - - 107
Csrey, Rev. Dr, - - 419
Carlisle Literary and Philosophical Society, - - 111
Cercocebus, comparative anatomy of, 437
Cetonia aurata, - - 294
Chalcites, - - 437
Chara vulgaris, on the reproductive organs of, - 383 ; 598
Charadrius morinellus, - 104
Chelones, distribution of, - 198
Chili, Leeches and Reptiles of, 414
Chionis, - - - 589
Chizærhis zonurus, - 277
Chloromyia, 164 ; Ch. flavicornis, 165 formosa, 164 ; polita, - 165
Chrysopelea, 144 ; Ch. Boieii, 144 ; Capensis, - - 145
Chrysops, 453 ; Ch. cæcutiens, 454 ; pictus, 456 ; relictus, - 455
Cladotoma, 254 ; Cl. ovalis, - 255
Clavaria juncéa, - - 511
Clitellaria, 154 ; Cl. ephippium, 155
Closteries, Morren on the, - 488
Clupea alba, 50 ; 294 ; Cl. sprattus, 52 ; harengus, - - 54
Coccothraustes vulgaris, - 448
Colobus guereza, - - 276
Comparative Anatomy, its use in zoology, - - 14, 15
Conops nigra, - - 105
Cooper’s, D., ‘ Flora Metropolitana,’ noticed, - - 281
Coregonus pollan, - 247
Corythaix leucotis, - - 277
Couch, J., on the exuviation of the common crab, - 341–4
Couch, J., on the exuviation of Shrimps and Lobsters, - 170–3
Crab, common, the exuviation of, 341
Crocus aureus, - - 495
Crossbill, - - 103
Crustacea, on their metamorphosis, 11, 12
Crustaceans, sexes of, - 492
Cuckoos, natural history of, 213–225 ; 430-7
Cuculidæ, natural history of, 213 ; 430
Cuculinæ, - - 430
Cuculus, - - 436
Cuningham, Allan, - 406
Cuningham, R., his death, 109 ; 210
Curruca atricapilla, - 104
Cuvier’s ‘ Hist. Nat. des Poissons,’ noticed, - - 283
Cuvier, M. F., ‘ Hist. Nat. des Cetaces, reviewed, - 174–187
Cyclops, 309 ; Cy. castor, 324 ; chelifer, 328 ; depressus, 331 ; furcatus, 330 ; minutus, 326 ; quadricornis, 321 ; stromii, - 330
Cyclostomata, arrangement of, 405
Cygnus Bewickii, - 462 ; 464
Cypris, 514 ; C. detecta, 525 ; pubera, - - 524

Daubeny, Dr, on the action of Light upon Plants, and of Plants upon the atmosphere, - 205–6
Deccan, Fruits of the, - 303
Dickie, G., on the Reproductive organs of Pilularia globulifera, and the Globules of Chara vulgaris, 382
Distipsidera, 251 ; D. undulata, 252
D’Orbigny on the Raptores of S. America, - - 347—350
D’Orbigny, Voyage dans l’ Amerique Meridionale, noticed, - - 108
Doubleday, H. on the Hawfinch, 448
Douglas, D. notice of, - 578
Drosera filiformis, - - 267
Duclos’ Monograph of the ‘ Oliva,’ noticed, - - 108 ; 284
Dumeril, M. C. and Bibron’s ‘ Erpetologie Generale,’ noticed, 285
Duncan, J., Characters and Descriptions of the Dipterous Insects of Britain, 145–167 ; 359–368 : 453-6

Edinburgh Zoological Garden, 107
Ehrenberg on the Luminosity of the Sea, - - 409
Elaphomyces granulatus, - 499
Enneapterygius, - 279
‘ Entomological Magazine,’ noticed, - 192 ; 288 ; 490 ; 576
Entomological Society, Proceedings of, - - - 109-10
Entomology of Edinburgh, additions to, - - - 494
Entomostraca, British, the History of, 35–41 ; 309–333 ; 514–526
Epacris microphylla, - 287
Erica Mackaiana, - 201
‘ Erpetologie Generale’ by Dumeril and Bibron, noticed, - 285
Erythrophrys, - - 436
Eschares, Edwards on the, - 588
Esenbeck, C. G. Nees ab, ‘ Hymen-

opterorum Ichneumonibus affinium Monographiæ,' noticed, 482
Eudynamys, - - 437
Eyton, T. C., his History of rare British Birds, noticed, 400
Eyton, T. C. on the Anatomy of the genus Cercocebus, - 437–9

Falco rufipes, - - 491
'Fauna Japonica,' notice of, 205
Fauna, Local, importance of, 421
Ferns, on the Germination of, 333–441
Ferns, Structure of, - 412
Férussac, Baron de, his death, 112
Festuca duriuscula, - 141
Fishes British, Yarrell's History of, reviewed, - - 384
Flora of Ayrshire, contributions to, 498
'Flora, The British,' reviewed, 93–8
'Flora, The English,' reviewed, 93–8
'Flora, Hibernica,' reviewed, 262
Flora, Local, on the construction of, - - 424, 430
'Flora Metropolitana,' noticed, 281
'Flora The Northern,' reviewed, 396
Flustræ, the ova of, - 246
Forbes, E. on the Testacea of the Alps, - - 257–9
Fungi, British, notices of, 42–9 : 507–13

Galloway, Botany of, - 295
Gasterosteus semiarmatus, - 201
Gazza, . - 279
Geotrupes lethroides - 256
Golden Eagle, digestive organs of, - - 129–134
Gould's 'Synopsis of the Birds of Australia,' noticed, - 571
Gould's Birds of Europe, - 572
Gould's 'History of Birds,' announced, - - 108
Gould, J., on the genus Paradoxornis, - - - - 62–4
Gould's Monograph of the Rhamphastidæ reviewed, - 187, 192
Graham's, Prof., Botanical Excursion to Galloway, - 295
Grant on the Ova of Flustræ, 246
Greville, R. K. on the Entomology of Edinburgh, - - 494

Haliochærus griseus, - 302
Hawfinch, Notes on the, 448
Hæmatopota, 457. H. pluvialis, 457
Helianthoid Polypes, - 239
Helix algira, 486; scarburgensis, 201
Helvella elastica, - 418
Henderson, J. on the germination of Ferns, - - 333–341
Henslow, J. S., on the disunion of contiguous Layers in the wood of Exogenous Trees, 32; on the requisites for the advance of Botany, 113; on the Flower of Adoxa moschatellina, 259; on two new species of opuntia, with remarks on the fruit of Rhipsalis, - 466
Henslow's Catalogue of British Plants, reviewed, - 393
Herbarium Willdenowian, - 417
'Herpetologia Mexicana,' noticed, 401
Herring, The, - - 54
Herring, Garvie, - - 52
Hersilia, - - 491
Hieracium, nov. sp.? - 187
Hipparchia blandina, - 105; 491
Histiophorus immaculatus, - 485
Honey-Bee, - - 57
Hooker, Sir W. J. his 'British Flora,' noticed, 98; his 'Icones Plantarum,' 418; his 'Companion to the Botanical Magazine,' 289; 403; 578
Hyboma carinata, - 256
Hybrids between the Grouse and Pheasant, - - 450
Hydra viridis, - - 236
Hydraform Polypes, - 235
Hygrophila, - - 265
Hypericum, - - 489

Ichthyology, British, Contributions to, - - 526–8
Ichthyology of the Firth of Forth, 50–57; 344–7
'Iconographia della Fauna Italica,' reviewed, - - 82–93
Ilex Paraguayensis, - 207
'Indes Orientales, voyage aux,' reviewed, - - 269
Insects, Dipterous, of Britain, 145–167; 359–368; 453–9
Ireland, Contributions to the Nat. History of, - - 459
Isaria brachiata, 49; citrina, - 49

Jameson on the Birds of Northern India, - - 209
Jardine, Sir W., and P. J. Selby's 'Illustrations of Ornithology,' noticed, - - 573
Jenyns, L. on the study and present state of Zoology, - 1–31
Johnston, G., History of British Zoophytes, 64–81; 225–247; 440–8; Miscellanea Zoologica, 368–382; 529, 538
'Journal, American, of Sciences and Arts,' noticed, - 102
'Journal, the Edinburgh New Philosophical,' analysis of, 99; 286; 402; 574

Jungermannia Mackaii, 296 ; pusilla, 592 ; Woodsii, - 107
Jussieu, his death, - 419

Labrus rupestris, - 170
Larus minutus. 491 ; Sabinii, 460, 464
Larvæ, parasitic, - - 295
Lea, J. ' On the genus Unio,' noticed, - - 284
Leach, Dr, his death, - 419
Leathes, G. R., his death, - 112
Leeches of Chili, - 414
Leontodon taraxacum, - 138
Leucojum æstivum, - 499
Lichens, new British, - 297
Link on the structure of Ferns, 412
Linnæan Society, Transactions of, noticed, - - 573
' Linnea,' analysis of, - 587
Lobster, on the Exuviation of, 170–3
Loxia curvirostra, - 103
Lucanus camelus, - 302
Luminosity of the Sea, 409–12 ; 491
Lutjanus rupestris, - 167

Macgillivray, W., on the Digestive Organs of Birds, - 125
Machilis polypoda, - 488
Mackay, J. T. ' Flora Hibernica,' reviewed, - - 262
Macquart's ' Dipteres,' noticed, 567
Macrorampus griseus, - 104
' Magazine of Natural History,' analysis of, 100 ; 287 ; 402 ; 489 ; 575
Mangel Wurtzel, - - 301
Marsiliaceæ, - - 496
Medico-Botanical Society, 110 ; 207 ; 306 ; 500 ; 592
Melancomium bicolor, - 49
Monochirus minutus, - 527
Moscow, Memoires de la Soc. Imp. des Naturalistes de, noticed, 583
—Bulletin de la Soc. - 584
Mosses, new British, 296
Motacilla neglecta, - 200, 491
Murray, A. his ' Northern Flora,' reviewed, - - 396
Myxinoideæ, the anatomy of, 404–9
Nemertes, 529 ; N. gracilis, 534 ; lactiflorea, 534 ; melanocephala, 535 ; octoculata, 537 ; olivacea, 536 ; pulchra, 535 ; purpurea, 537 ; quadrioculata, 535 ; rufifrons, - - - - 537
Nemotelus, 158 ; N. brevirostris, 160 ; nigrinus, 159 ; pantherinus, 159 ; uliginosus, - 158
Neritina fluviatilis, - 201
Newcastle-upon-Tyne, state of Nat. Hist. in, - - 203
Noctuadæ, Northumbrian, 415
Nymphon, 376 ; N. femoratum, 380 ; gracile, - 380

Odontomyia, 151 ; O. argentata, 152 ; felina, 153 ; hydroleon, 153 ; hydropota, 153 ; ornata, 152 ; tigrina, 154 ; viridula, - 154
Opuntia Darwinii, 466 ; galapageia, 467
Orithya, 376 ; O. coccinea, 378
' Ornithologist's Text Book,' noticed, - - 281
Oxycera, 155 ; O. analis, 158 ; formosa, 157 ; muscaria, 157 ; pulchella, 156 ; terminata, 157 ; trilineata, - - 156
Oxylophus, - - 436

Pachygaster, 166 ; P. ater, 166 ; Leachii, - - 167
Palæmon serratus, - 171
Pallene, 376 ; brevirostris, 380
Paludinæ, - - 201
Paradoxornis, 63 ; flavirostris, 64
Parmacella, - - 492
Parnell, R. on the Ichthyology of the Firth of Forth, 50–7 ; 344–7 ; Contributions to British Ichthyology, - - 526–8
Parr, The, notice of, - 287
Peat, formation of, - 305
Perdix melanocephala, 278 ; Erckellii, - - - 278
' Perroquets, Collection de,' by St Hilare, announced, - 282
Persoon, M. death of, - 595
Peziza fusarioides, 46 ; rosæ, 46 ; sanguinea, - - 46
Phascidium coronatum, - 513
Phœnicura tithys, - 104
' Philosophia Botanica,' announced, 417
Phlebia vaga, - 511
Phoca vitulina, - - 103
Phocæ, the habits of, - 530
Phoxichilus, 376 ; spinosus, 377
Physarum metallicum, - 49
Physis furcatus, - - 104
Pilularia globulifera, 306 ; 591 ; on the reproductive organs of, 382 ; 497
Pleurotuchus, 142 ; 491. Pl. Desjardinii, 143 ; typicus, - 143
Poinsettia, - - 99
' Poissons, Histoire Naturelle des,' noticed, - - 283
Polan, The, - 247
Polyangium vitellinum, 47
Polypes, structure of, - 246
Polypidoms, formation and structure of, - - 440
Polypodium calcareum, 141
Polyporus cinctus, - 43
Pristurus, - - 279

Pritchard, Dr, on Species, 305
Pseudochromis, - 279
Psiloma arundinis, - 49
Pteropus Whiteii, - 485
Ptilonorhynchus albirostris, 277
Pycnogonidæ, British, 368–375
Pycnogonum, 376; littorale, 376
Pyronema marianum, - 45

Quadrupeds, British, Bell's History of, noticed, - - 280
Questions de l'Academie Royale des Sciences de Berlin pour 1837 et 1839, 202

Raniceps trifurcatus, 104; 201; 344
Raptores of S. America, 347–359
Raspail on the structure of Polypes, 246
Regulus ignicapillus, - 491
Reptiles of Chili, - 414
Reptiles, South African, two new genera of, - - 141–5
Rhipsalis, on the structure of the fruit of, - - 469
Richardson, Dr, on the Zoology of N. America, - 298
Rossmæssler's 'Forstinseckten,' noticed - - 483
Royal Society, Edinburgh, Proceedings of - - 110
Royle on the properties of Caoutchouc, - 303
Rubus, - - 296
'Rumphia,' by Blume, noticed, 280
Ruppel, Ed. - 109
Ruppel's 'Neue Wirbelthiere,' reviewed, - - 275
Rusconi on the ova of Fish, - 586

Sabine, J. his death, - 595
Salmon, food of, - 300
Sargus, 160; cuprarius, 161; flavipes, 162. infuscatus, 162; nitidus, 162; Reaumuri, - 163
Sceptranthes, - 99
Sclerotium cornicola, 511; medullare, 47; truncorum, 511
Scolopax major, - 415
Seal, habits of, - 103, 539
Selby, P. J. on the Lutjanus rupestris of Bloch, 167–170; on the importance of a Local Fauna, 421–4
Shrimps, the Exuviation of, 170–3
Siebold's 'Fauna Japonica,' noticed, - 205
Silene otites, - 495
Sitta europæa, - 103
Smith, Dr. 109; his characters of two new genera of S. African Reptiles, - 141–5
Smith, Sir J. E. his 'English Flora' reviewed, - 93
Society, Belfast, Nat. History, 308
Society, Botanical, of Edinb. 106; 416
Society, Botanical, of London, 415; 500-92
Society, Medico-Botanical, 207, 306, 500
Society, Royal - 205
Society, Royal of Edinburgh, 208
Society, Shropshire and North Wales Natural History and Antiquarian, 210
Society, Tweedside Physical and Antiquarian, - 307; 504
Spartina glabra, - 499
Sparus auratus, - 294
Sphæria angelicæ, 48; arundinis, 48; decedens, 47; detrusa, 47; favacea, 47; herpotricha, 48; hypoderma, 47; microstoma, 47; pantherina, 47; rubiginosa, 47; sanguinea, 48; velata, 47; xanthostroma, 47
Sphæronema blepharistoma, 512
Spiranthes autumnalis, 499
Spirula Peronii, - 414
Sprat, the - - 52
Sterna stolida, - 459
Stilbospora angustata, - 49
Stilbum anomalum, 49; piliforme, 49; rigidum, 49
Stratiomydæ, - 146
Stratiomys, 146; S. chamæleon, 148; furcata, 150; potamida, 149; riparia, 150; strigata, - 151
Swainson, W. on the natural history and Relations of the Cuckoos, 213, 225, - - 430-7
Swainson's Natural Histories in 'Lardner's Cyclopædia' reviewed, -545–566
Sykes, Col., on the fruits of the Deccan, 303; On the Quails and Hemipodii of India, - 484
Syncesia, - - 266

Tabanidæ - - 359
Tabanus, 360; T. autumnalis, 363; bovinus, 362; bromius, 365; fulvus, 368; luridus, 366; montanus, 365; micans, 363; rusticus, 367; solstitialis, 366; tarindinus, 364; tropicus, 367; vittatus, 364
Tadpole Fish, - - 344
Taraxacum dens-leonis . 137
Tea, . . 195
Tea, Paraguay, . . 207
Teale on Alcyonella stagnorum, 293
Temminck 'Monographies et Recueil de Planches coloriées,' noticed, . . 108
Testacea of the Alps, . 257

Thelephora arida, 45; puteana, 44; spadicea, . . 511
Thompson, W. on Hybrids, 450; contributions to the Nat. History of Ireland, 459;—on the Polan of Loch Neagh, . . 247
Tozer, J. his death, . 112
Trees, exogenous, the structure of, 32–5
Tremella foliacea, . . 46
Trigla cuculus, 403; Lucerna, 526
Tringa pectoralis, . 200
Twizel, Fauna of, . 421–4

'Unio,' Lea on the genus, noticed, 264
Upupa epops, . . 491

Valenciennes' 'Histoire Naturelle des Poissons,' noticed, . 283
Vitrina pellucida, . 258

Watson, H. C. on the construction of a Local Flora, . 424
Webb, P. Barker, et Sabin Berthelot's 'Histoire Naturelle des Iles Canaries,' reviewed, . . 470
Wernerian Society, proceedings of, 110; 200
Westwood, J. O. Descriptions of Exotic Coleoptera, . 251–7
White bait, . . 59
Wiegmann's 'Herpetologie Mexicana,' noticed, . 401
Willdenowian Herbarium, - 417
Wilson, J. on the Habits of the Scotch Phocæ or Seals, . 539
Wood's, N., 'British Song Birds,' noticed, . . 262
Wood's, N., 'Ornithologist's Text-Book,' noticed, . 281
Woodcock, . . 2..

Xenodon, - - 279

Yarrell, W., 'History of British Fishes,' reviewed, 384; on an Insect destructive to Turnips, 485
Yew-tree, Longevity of, - 301

Zoology, Remarks on the Study of, 1
——— on its present state, - 31
——— of North America, - 298
Zoological Garden in Edinburgh, 107
Zoological Society of London, the 'Transactions' of, noticed, - 484
Zoophytes, British, the History of, 64–81; 225-247; 440–8—Their orders defined, - - 484

ERRATA.

Page 167, line 29, *for* southern, *read* northern.
—— 168, —— 4, *for* Barncleugh, *read* Bamburgh.
—— 169, —— 10, *for* first, *read* for it.
—— 200, —— 21, *for* Stoke-Maryland, *read* Stoke-Nayland.
—— 200, —— 26, *for* Mr Anderson, *read* Mr Audubon.
—— 250, —— 13, *for* 61500, *read* 6150.
—— 289, —— 10, *for* Thuckard, *read* Shuckard.
Plate VIII ought to be Plate IX.
—— IX—————— VIII.
For Plate XII, at page 376 et seq., *read* Plate XIII.

EDINBURGH:
PRINTED BY JOHN STARK, OLD ASSEMBLY CLOSE.

PLATE I.

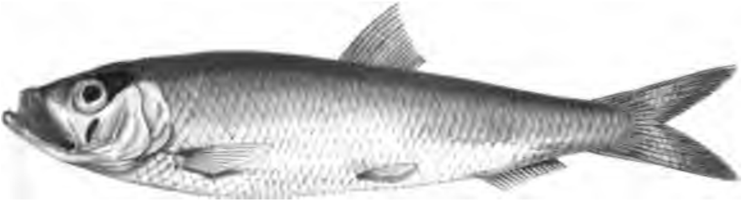
Fig 1

Whitebait

Fig 2

Sprat

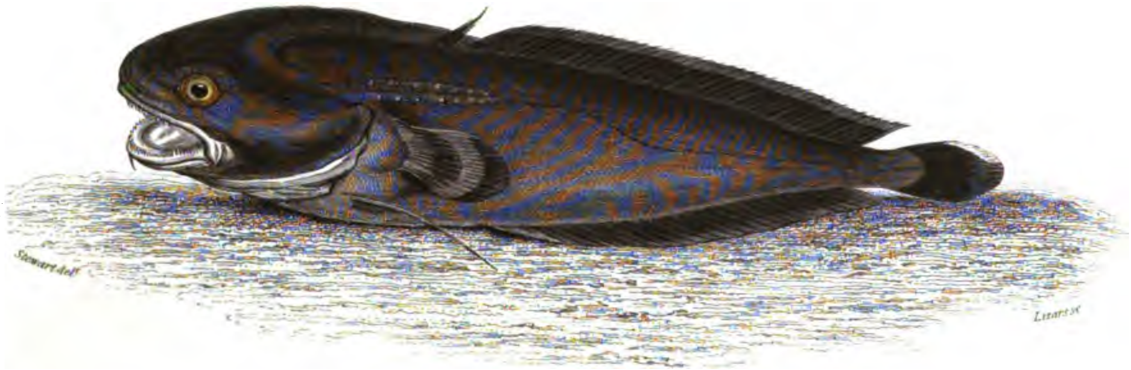
Fig 3.



Herring.

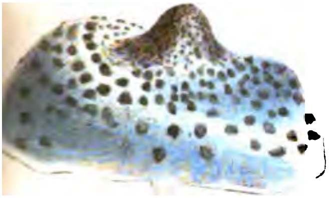
Stewart del. Zool. & Bot. Mag. Lizars sc.

PLATE Ia


Stewart del.
Lizars sc.

Raniceps trifurcatus.
Tadpole fish.

PLATE 2.



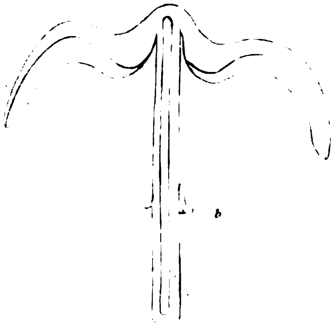


Fig. 1

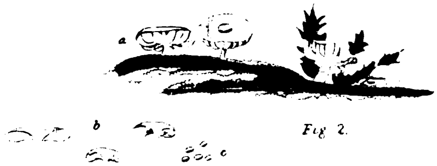


Fig. 2.

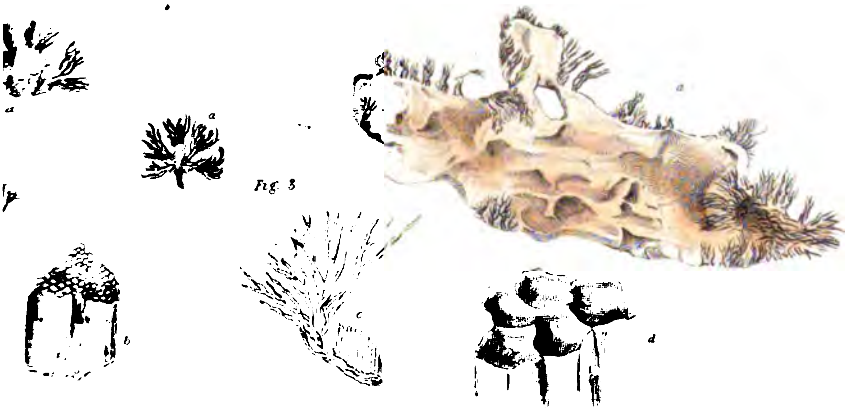


Fig. 3

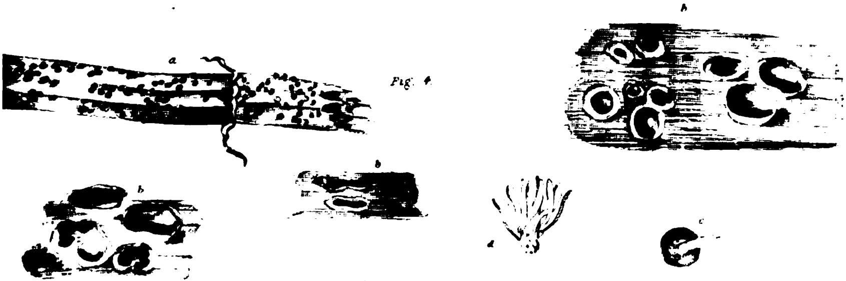


Fig. 4

Zool: & Bot: Mag.

Lizars.

PLATE 3.

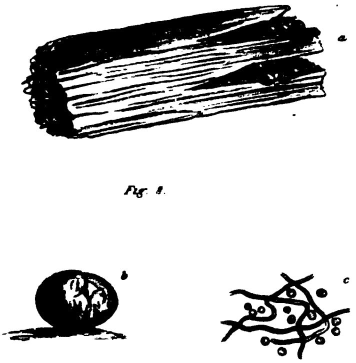


Fig. 8.

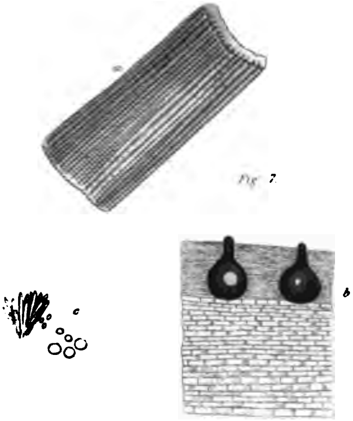


Fig. 7.

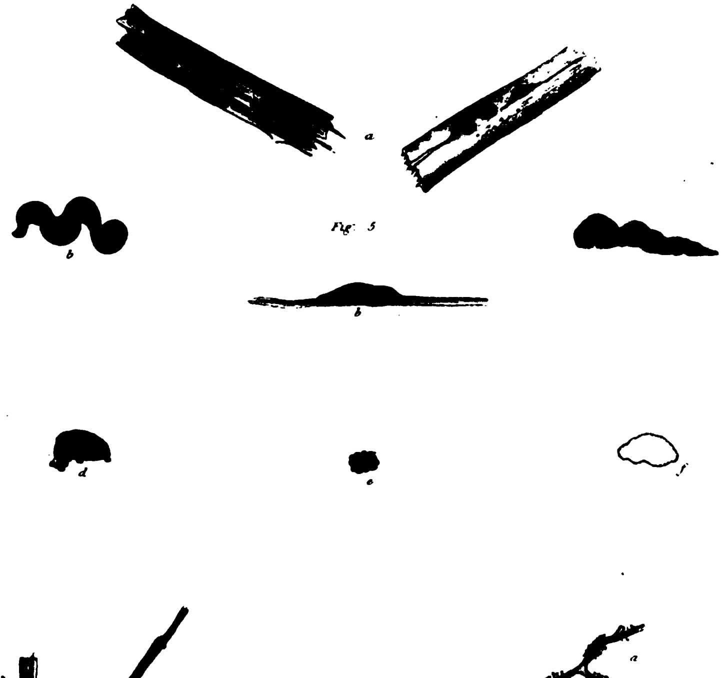


Fig. 5.

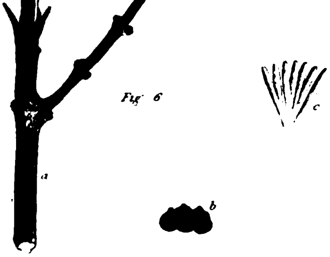


Fig. 6.

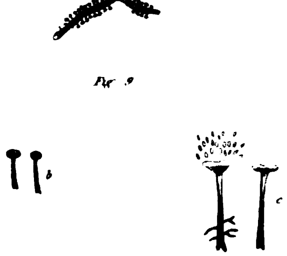
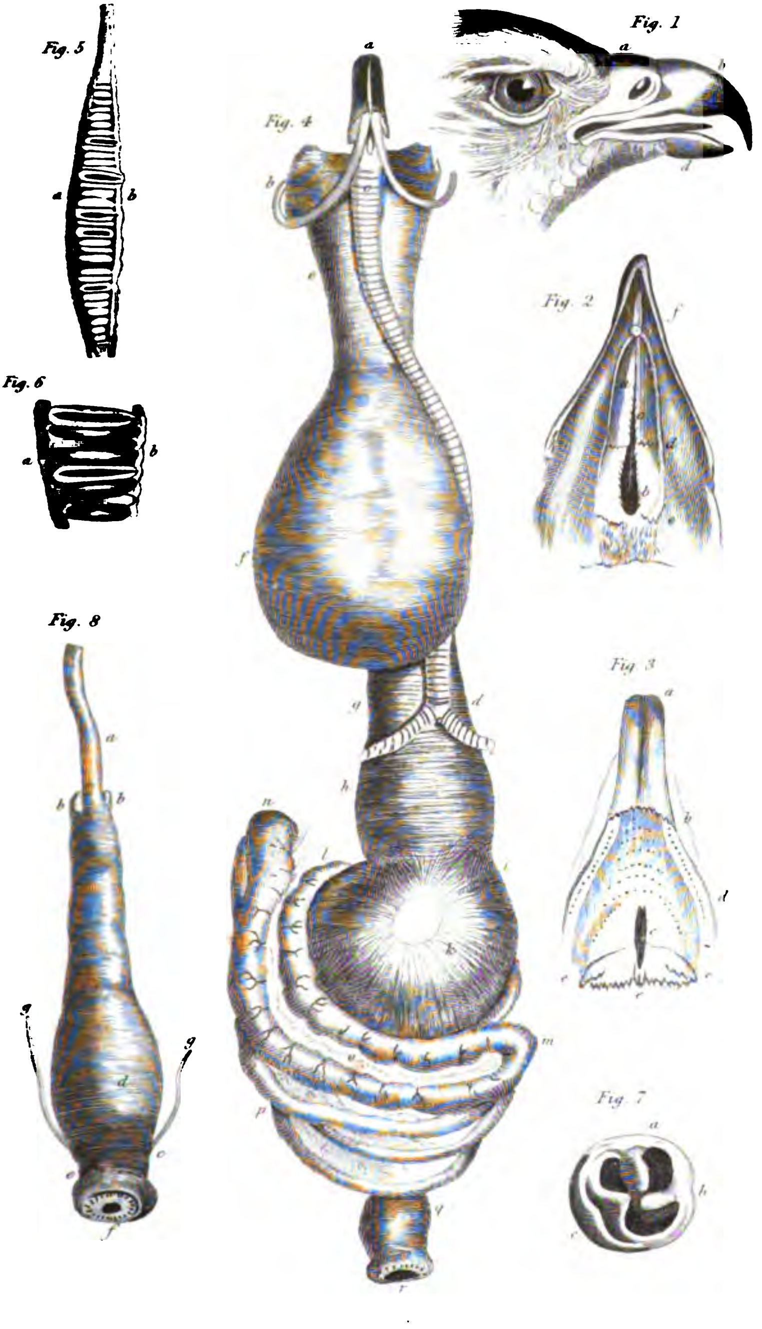


Fig. 9.

Zool. & Bot. Mag.

Lizars sc.

PLATE IV.

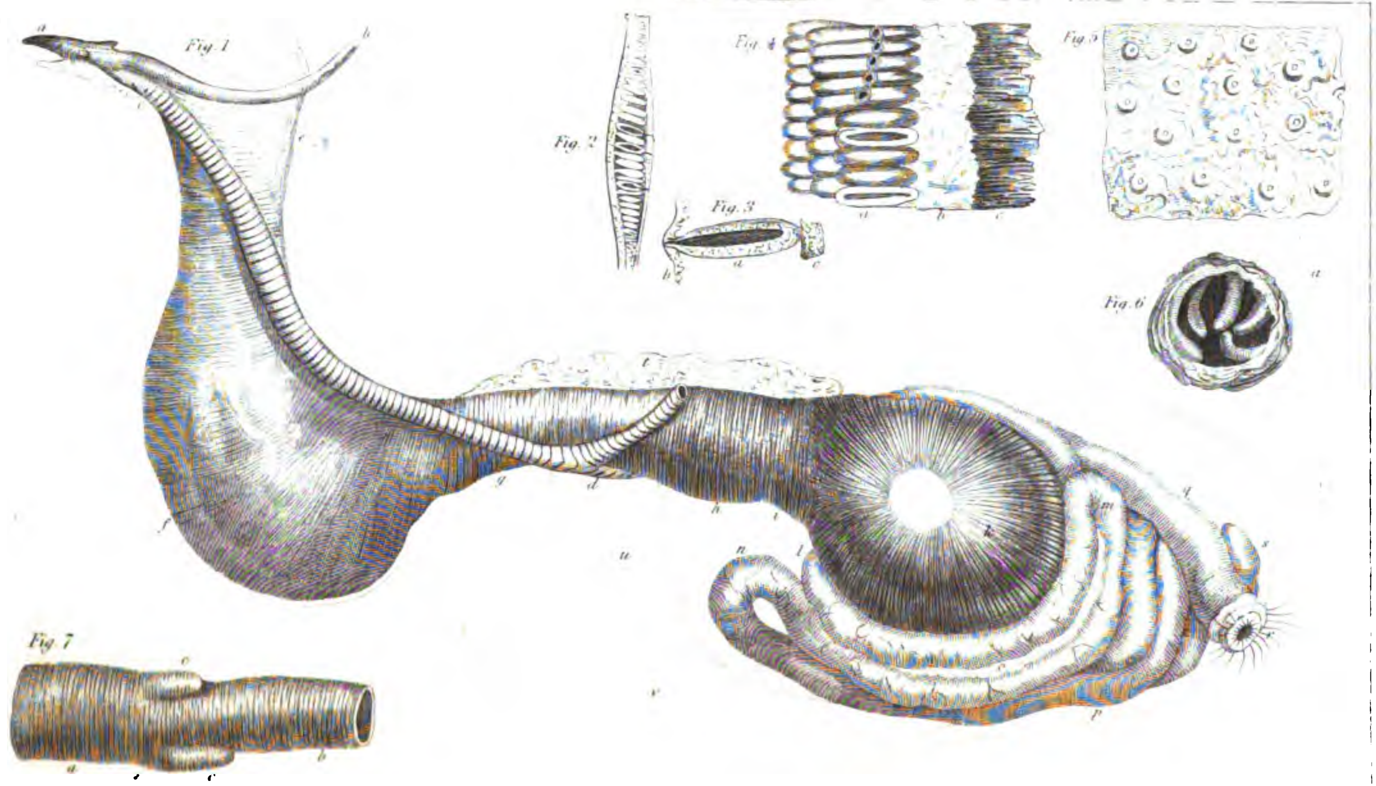


W. MacGillivray Del. Lizars sc.

Intestinal Canal of Aquila chrysaetus.

Zool. & Bot. Mag.

PLATE V.

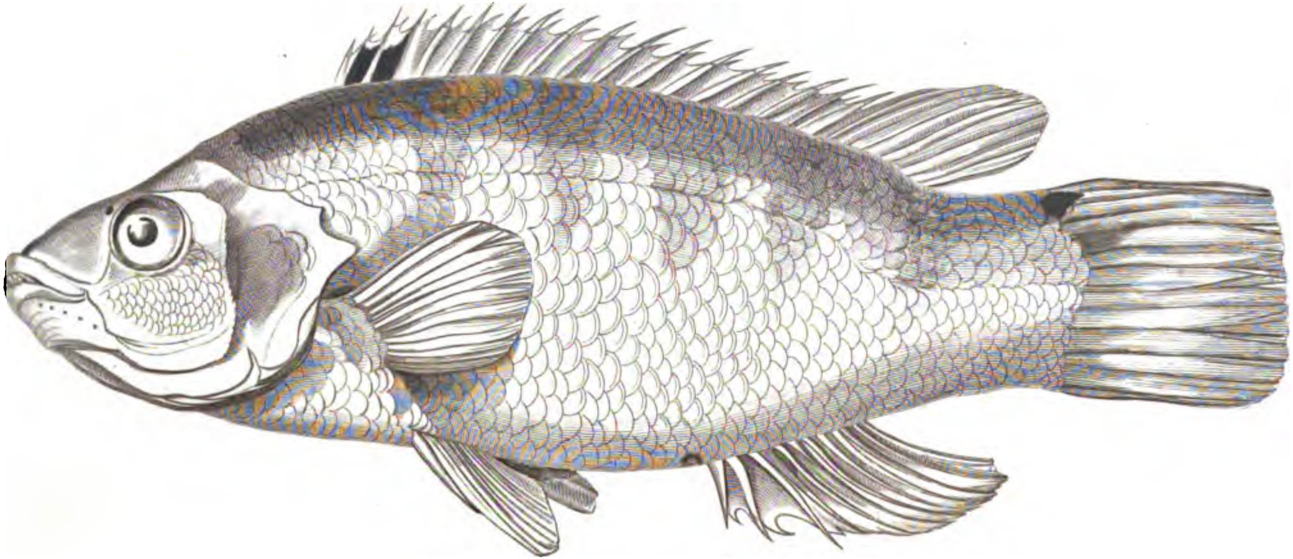


Wm MacGillivray Delt

Lizars sc.

Intestinal Canal of Buteo vulgaris

PLATE VI.



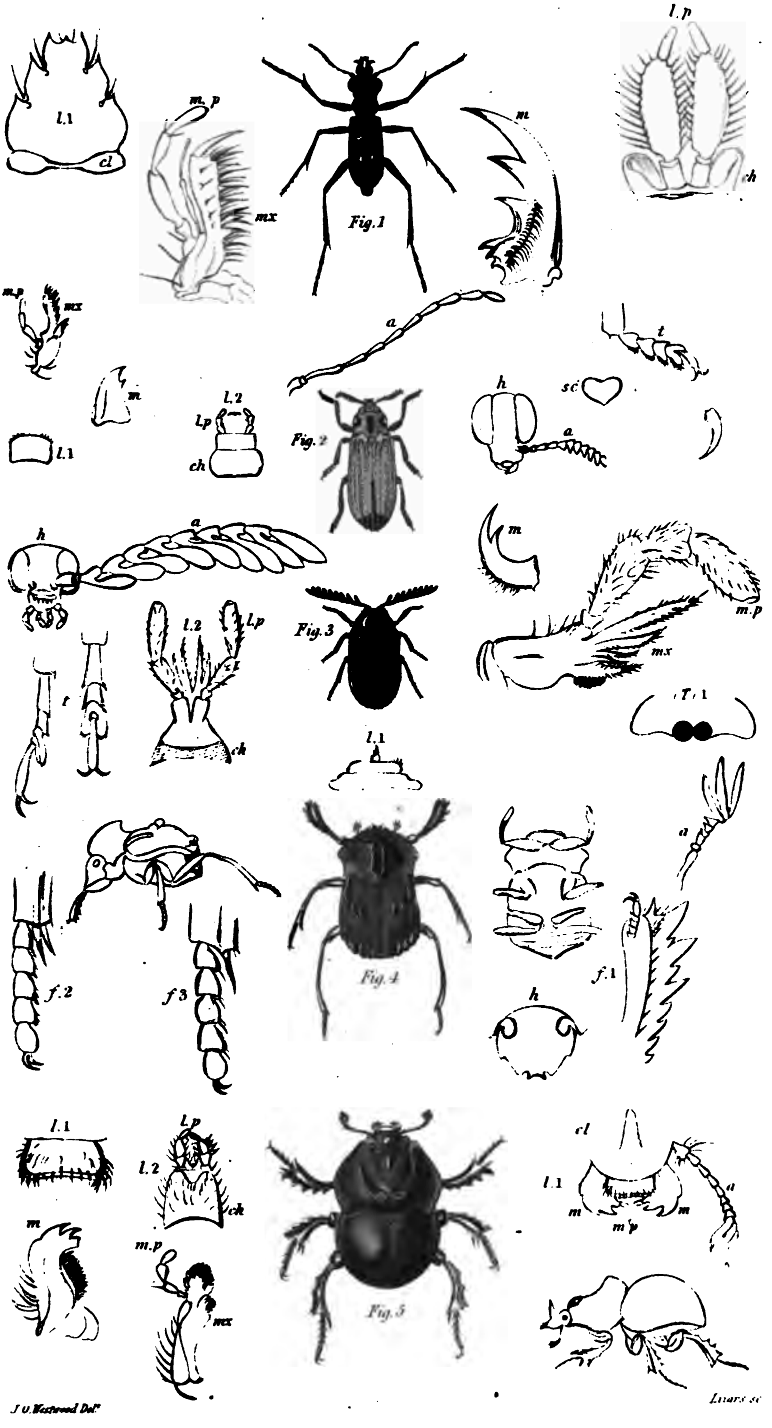
P J Selby delt

Crenilabrus rupestris

Lizars sc

Zool & Bot Mag

PLATE VII.



J O. Westwood Del^t

Lizars sc

PLATE ~~VIII~~ X

Fig. 1.

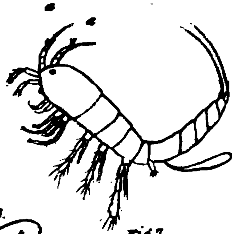


Fig. 2.

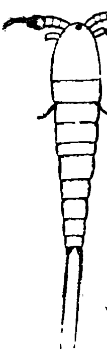


Fig. 3

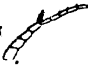


Fig. 4.

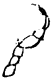


Fig. 5.

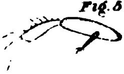


Fig. 6.

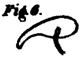


Fig. 7.

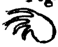


Fig. 8.

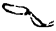


Fig. 9

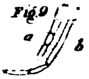


Fig. 10.

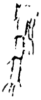


Fig. 11.

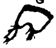


Fig. 12.

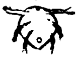


Fig. 13.

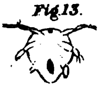


Fig. 14.

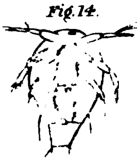


Fig. 15.

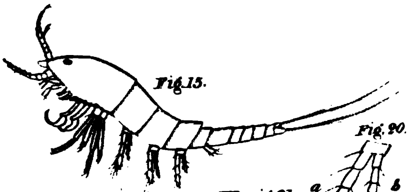


Fig. 16.

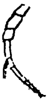


Fig. 17.

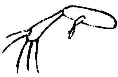


Fig. 18.

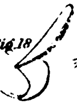


Fig. 19.

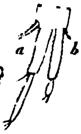


Fig. 20.

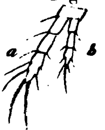


Fig. 21.

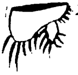


Fig. 22.

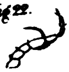


Fig. 23.

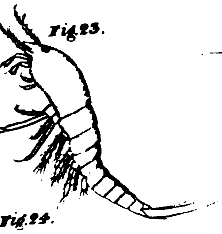


Fig. 24.

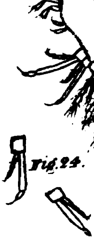


Fig. 25.

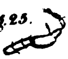


Fig. 26.

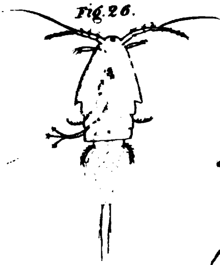


Fig. 27.

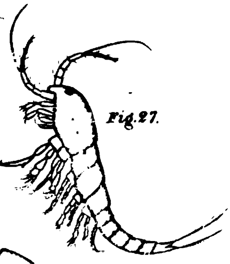
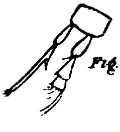


Fig. 28.



W. Baird del^t.

Zool: & Bot: Mag.

Lith.

PLATE VIII.

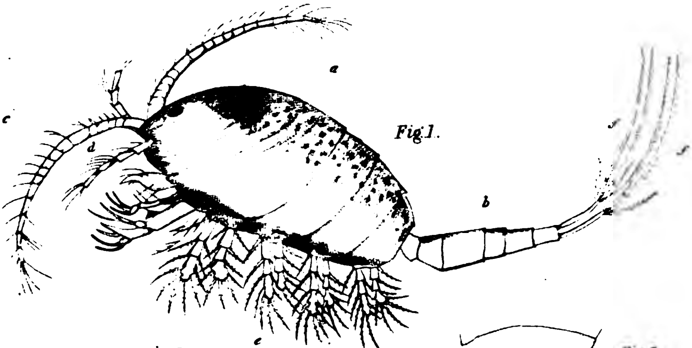


Fig. 1.

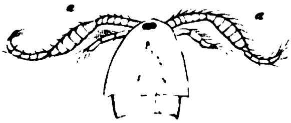


Fig. 2.

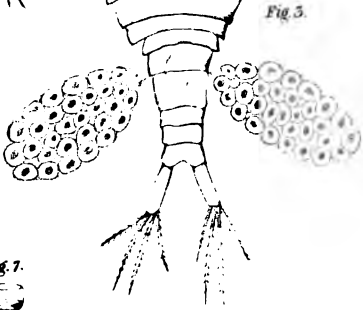


Fig. 3.

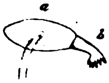


Fig. 4.

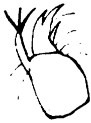


Fig. 5.

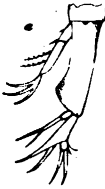


Fig. 6.

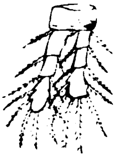


Fig. 7.

Fig. 8.

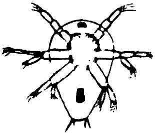


Fig. 9.

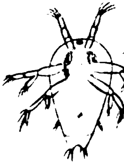


Fig. 10.

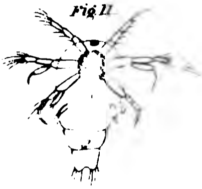


Fig. 11.

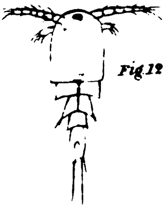


Fig. 12.

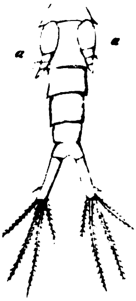


Fig. 13.

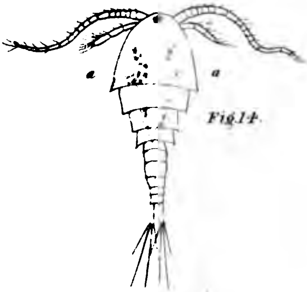
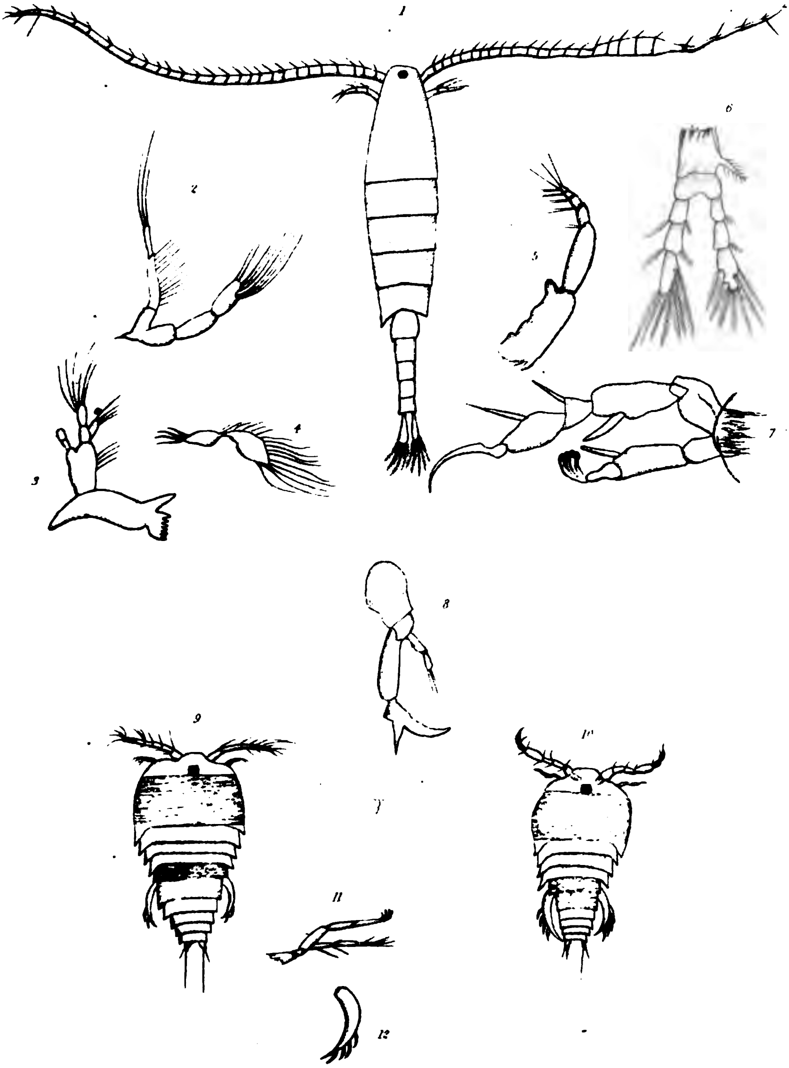


Fig. 14.

W. Baird delt

Zool: & Bot: Mag.

Lith



British Entomostraca.

W Baird F.R

W.H. Lizars sculp

PLATE XI

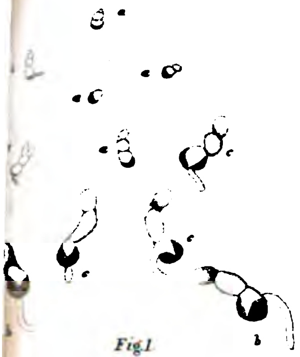


Fig. 1.

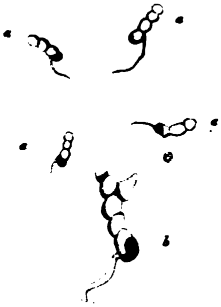


Fig. 2.

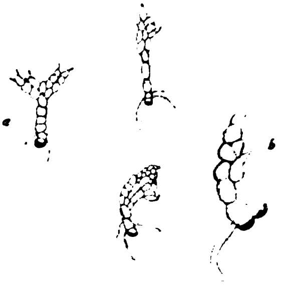


Fig. 3.

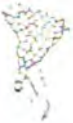


Fig. 4.

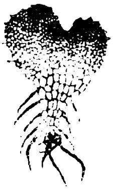


Fig. 5.

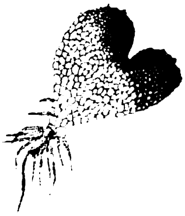


Fig. 6.

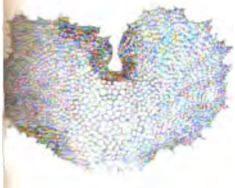


Fig. 7.

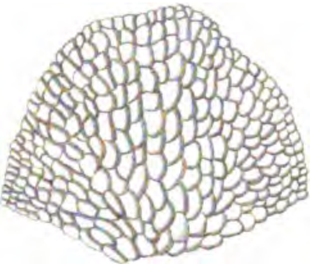


Fig. 8.

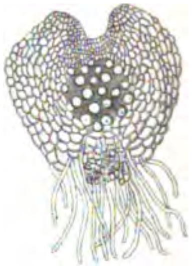


Fig. 9

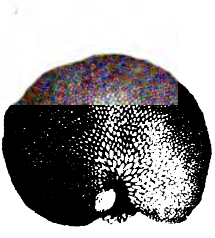


Fig. 10.

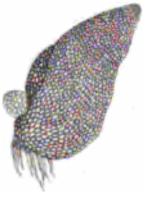


Fig. 11.

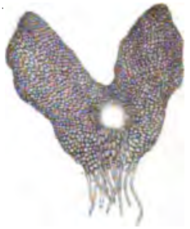


Fig. 12.

PLATE XII.

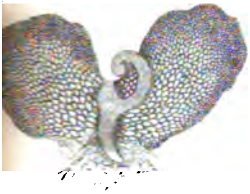


Fig. 13.

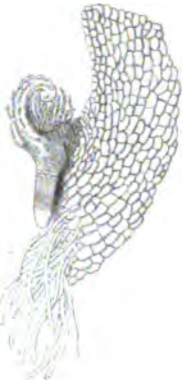


Fig. 14.

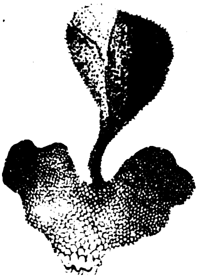


Fig. 15.

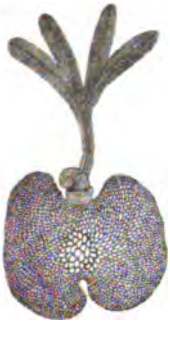


Fig. 16.

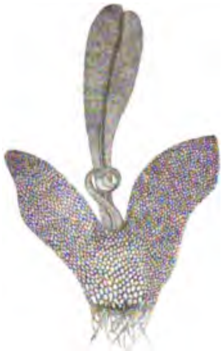


Fig. 17.

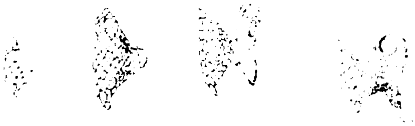


Fig. 18.

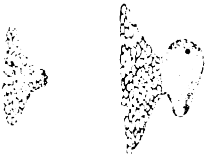


Fig. 19.

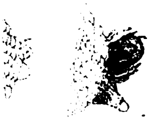


Fig. 20.

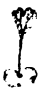


Fig. 21.

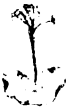


Fig. 22.

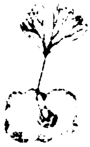


Fig. 23.

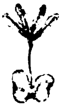


Fig. 24.

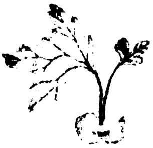
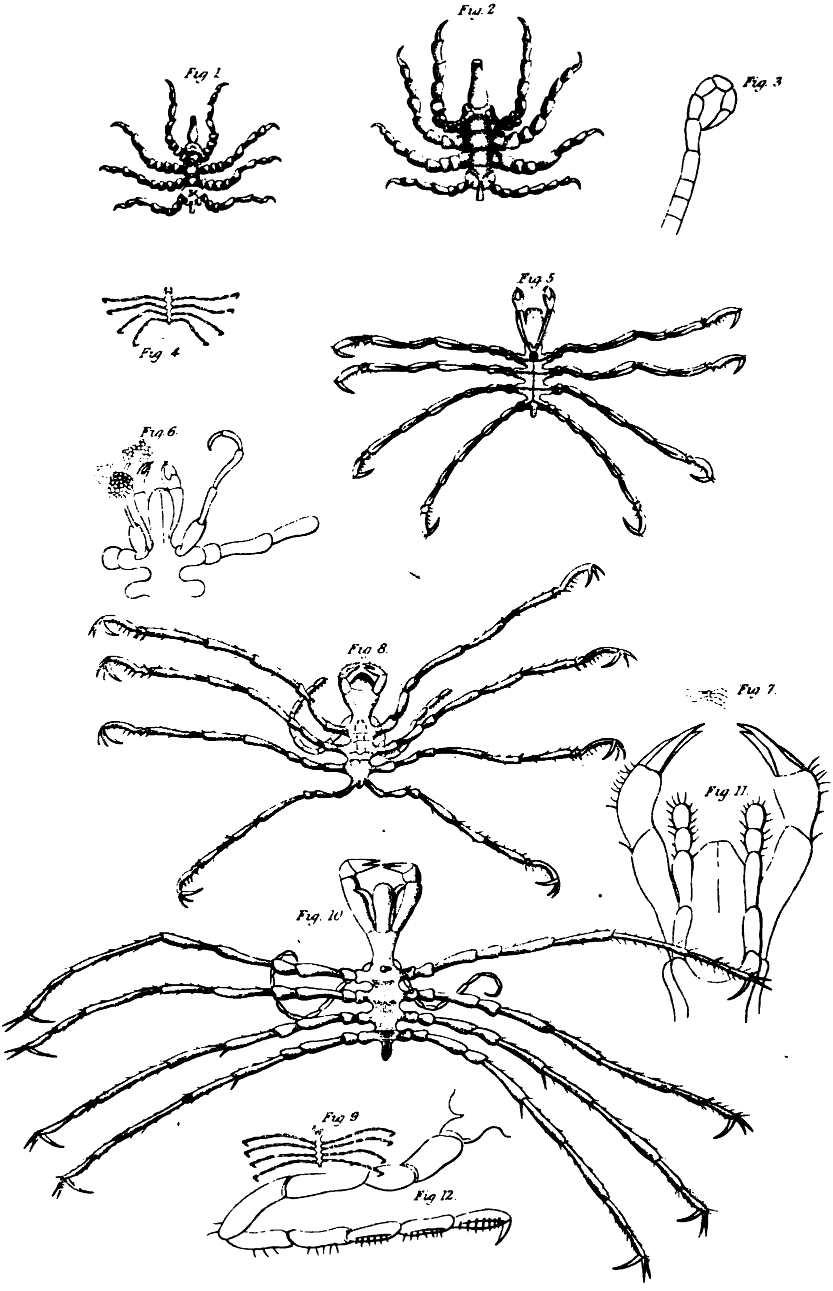


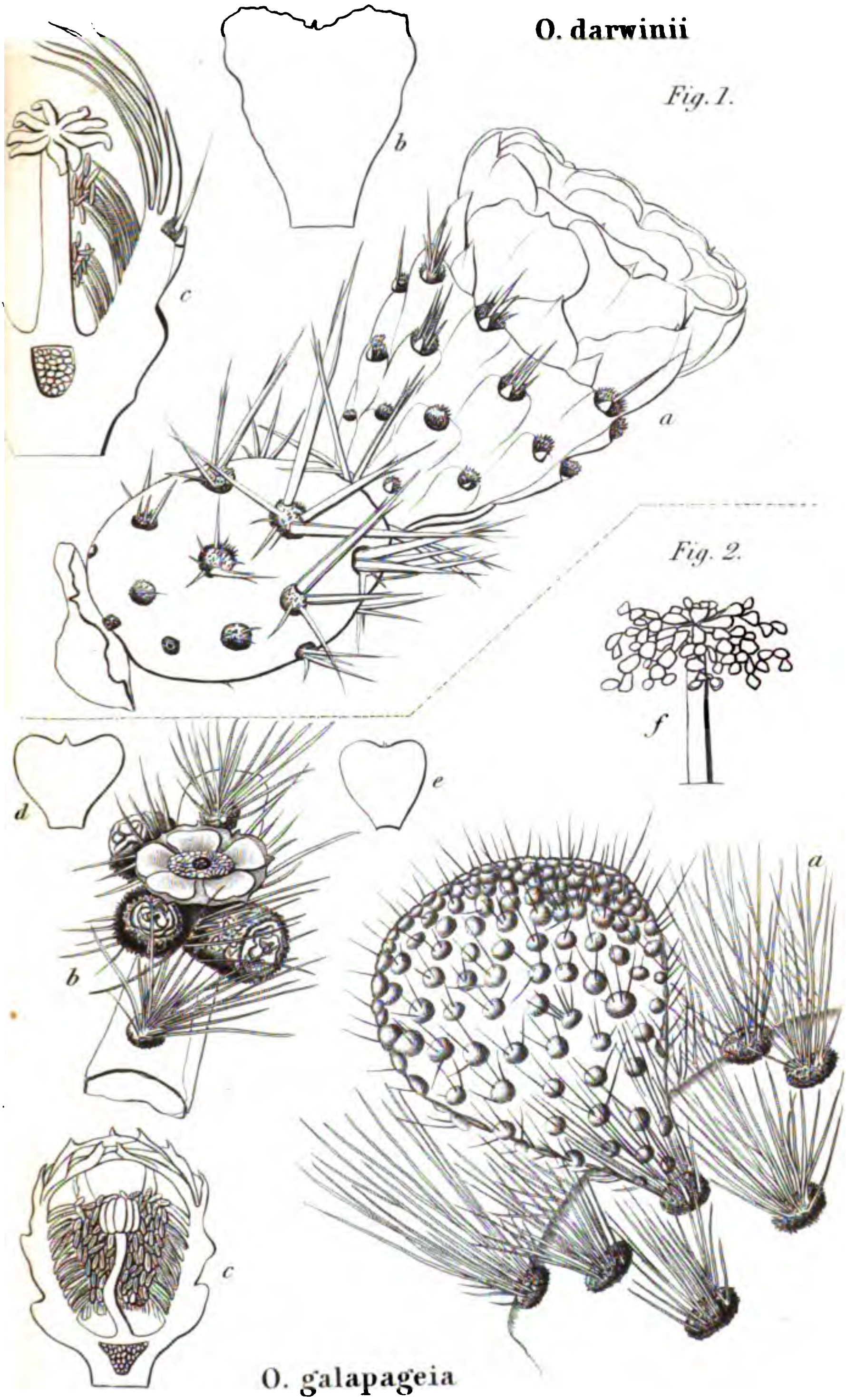
Fig. 25.

Zool. & Bot. Mag.

PLATE 13



n del.



J.S. Henslow del.t

W.H. Lizars sculp.t

PLATE 15

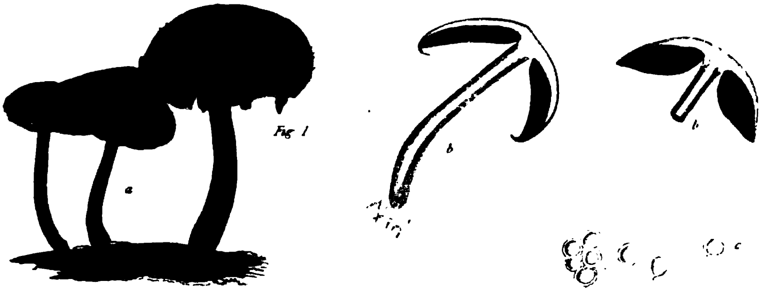


Fig 1

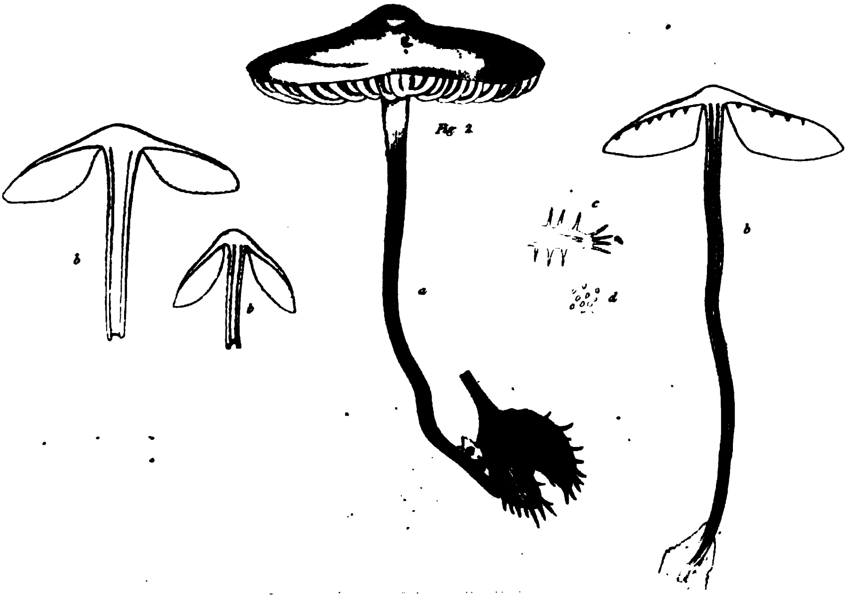


Fig 2

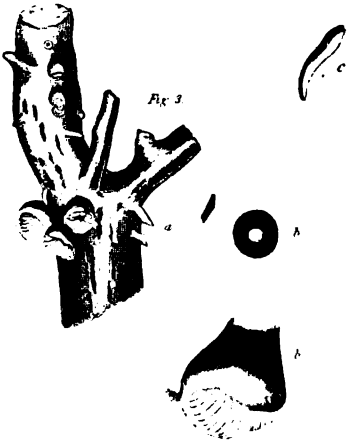


Fig 3

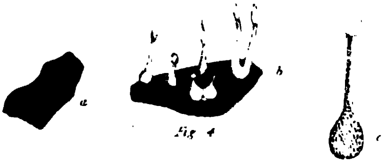
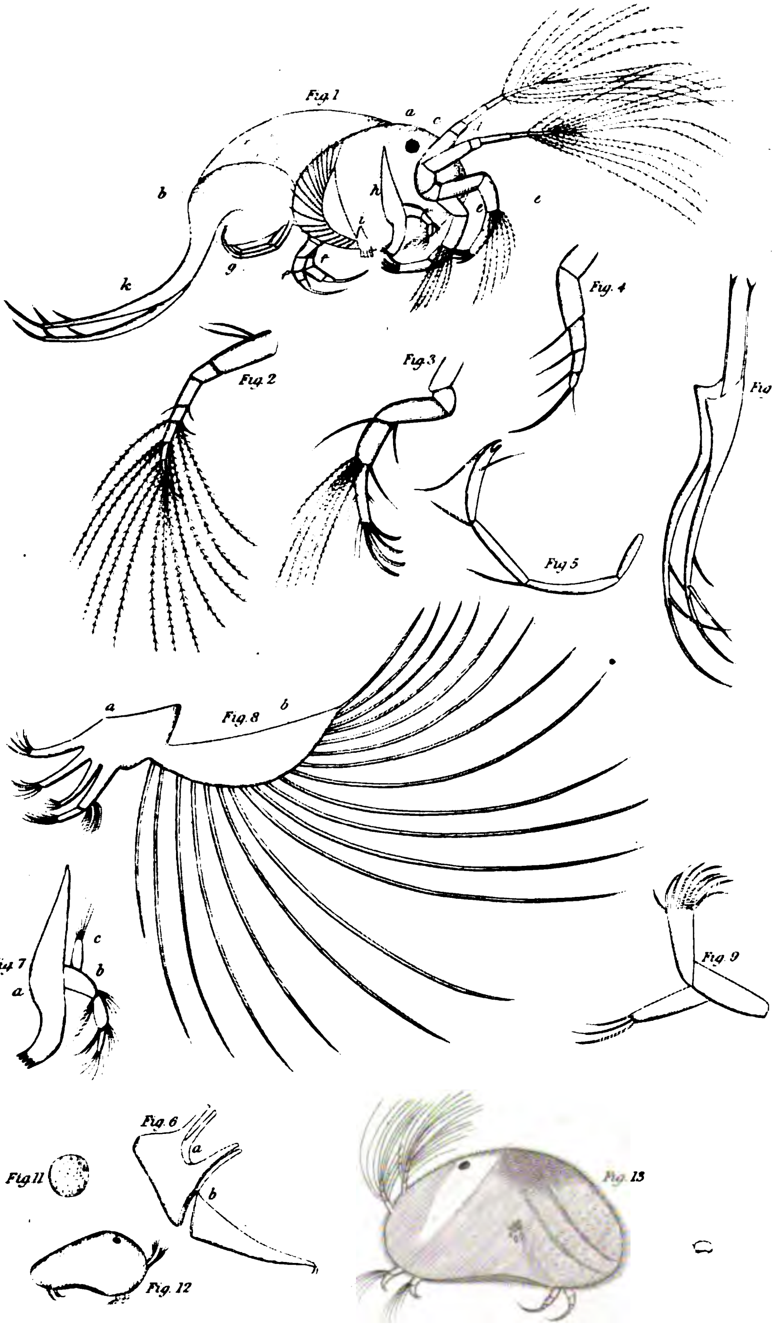


Fig 4

Fig 5

M. J. Berkeley Delt. Zool. & Bot. Mag. W. H. Lizars Sc.

PLATE 16

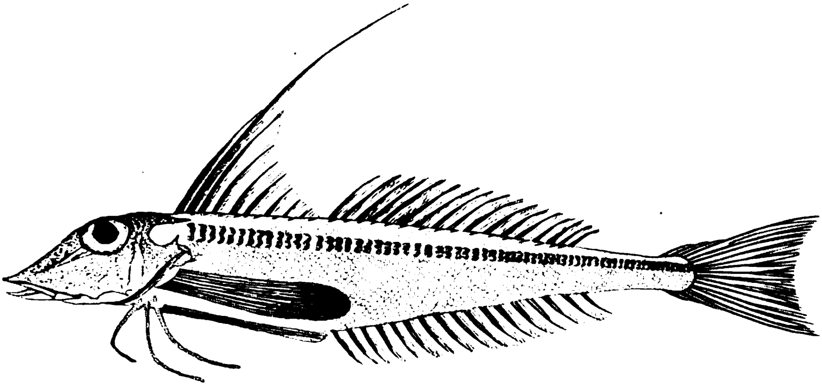


W. Baird. delt

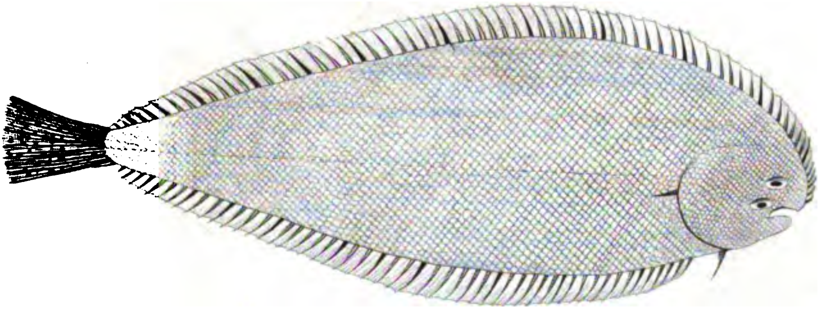
Zool. & Bot. Mag.

Lith.

PLATE XVI. N.º 2. Vol. I. page 526.



Trigla lucerna   Cuvier
Long finned Captain.



Monochirus minutus   Parnell
Small red Sole.

R. Parnell del.t & sculp.t

Vol 1 page 528. line 23. for left eye read right eye.

PLATE 17.

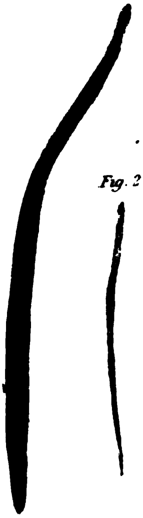


Fig. 2

Fig. 2*.

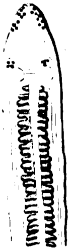


Fig. 5.

Fig. 1.

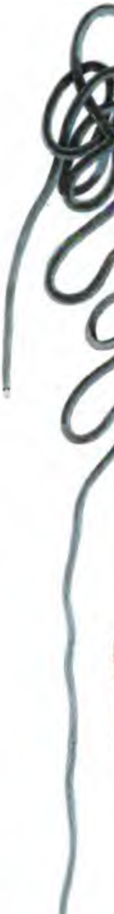


Fig. 1*.

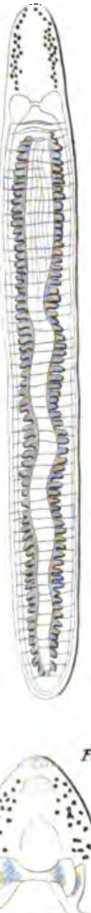


Fig 3.

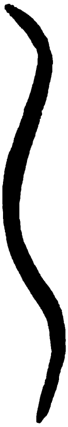


Fig 3*.

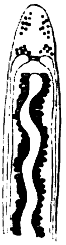


Fig. 5*.

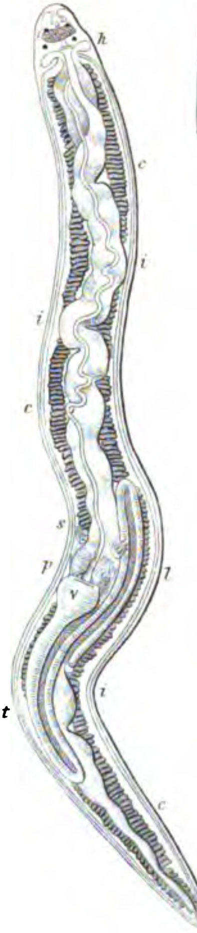


Fig. 6.

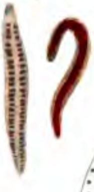


Fig. 6*.

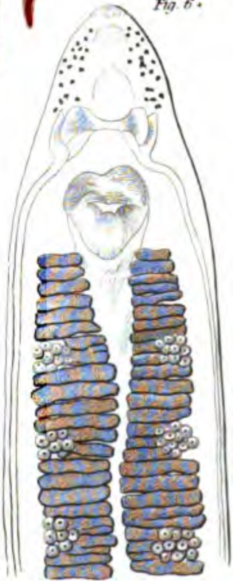


Fig 2**.

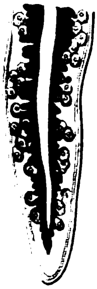
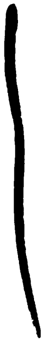


Fig. 4.

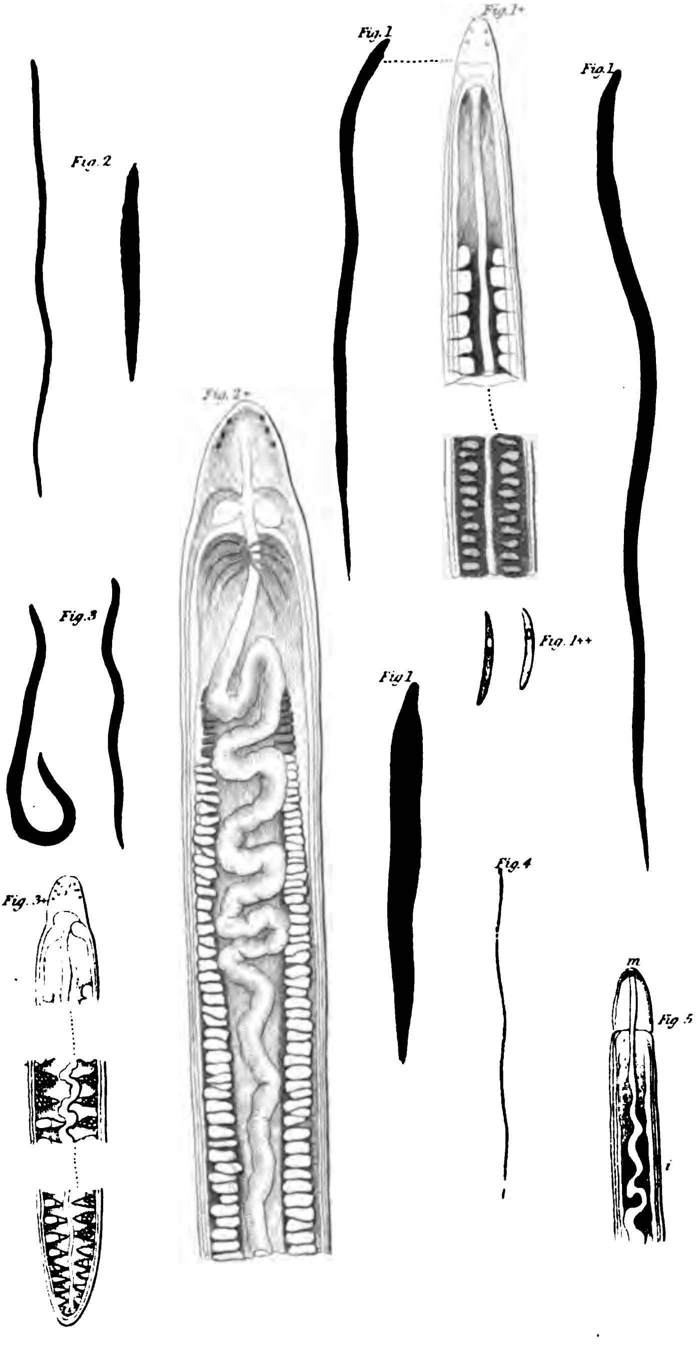


C. Johnston del^t.

Zool. & Bot. Mag.

W.H. Lizars sc.

PLATE 18.



C. Johnston del^t

Zool. & Bot. Mag.

J. H. Lizars